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Forest
Service

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NUBBLE VEGETATION MANAGEMENT PROJECT

Town of Bethlehem

Grafton County, New Hampshire

Environmental Assessment

Prepared By
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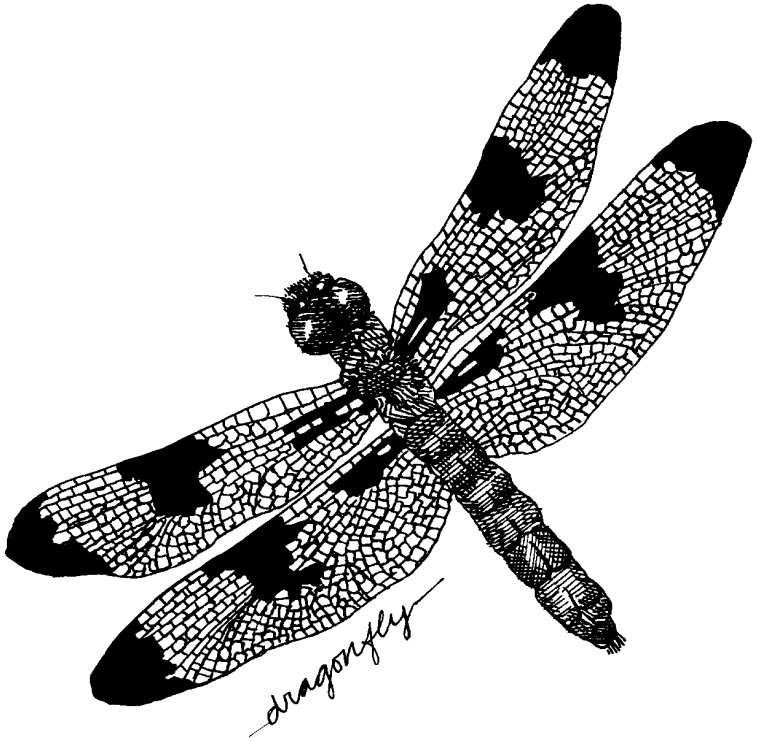

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NUBBLE VEGETATION MANAGEMENT EA
DOCUMENT SUMMARY

The Ammonoosuc/Pemigewasset Ranger District of the White Mountain National Forest is proposing the following management activities in the Nubble Project Area:

- Timber management on 1265 stand acres (720 treatment acres); and
- Pre-haul road maintenance on 5.5 miles of road.

The project area is located in the town of Bethlehem, Grafton County, New Hampshire on the Ammonoosuc/Pemigewasset Ranger District of the White Mountain National Forest. The Nubble Project Area consists of approximately 3,900 acres of federal lands (Management Area 2.1 and 3.1 lands in Habitat Management Units 110 and 111) (Map 1).

The following list describes the "need for change" identified for the Nubble Project Area that would meet the project's purpose of implementing the Forest Plan:

- There is a need to manage vegetation so that there is a variety of wildlife habitats. There is a need to increase the regenerating forest age class.
- There is a need to provide an adequate transportation system for both short- and long-term access to facilitate the management of National Forest Lands and to provide motorized recreation opportunities.
- There is a need to provide wood to meet peoples' demand for wood products such as furniture, paper, fiber, and construction materials.

Table A displays the Proposed Action for the Nubble Project.

The proposed action may result in the following effects:

- Possible short-term, localized, soil compaction;
- Short-term minor sedimentation may occur at temporary stream crossings if installed during summer or fall;
- Some treatments would have minor visual effects on the hillsides as viewed from Twin Mountain and from the Beaver Brook Cross Country Ski Trail.
- Snowmobile traffic would be detoured from normal locations to alternate routes for one to two years.
- Areas where clearcutting and group selection harvesting would occur would create temporary openings and allow new tree seedlings to become established, create a minor reduction in the mature/over-mature forest community stage, and create an over-all increase in age-class diversity;
- Indirectly the increase in regenerating habitat would benefit the majority of management indicator species, and conversely where openings were created, the few management indicator species that favor closed canopy habitat would not benefit from this action;
- There would be a very low potential for minor, localized, and short-term direct and indirect effects to amphibian, reptile, and fish habitat as related to sediment, turbidity, and/or travel impediments and displacement; and
- There is a potential net return to the US Treasury of $537,349; a 10% timber tax return of $98,000 to the Town of Bethlehem; and a return to the 25% Fund of approximately $245,000.

Table A: Proposed Action

Activity	**Amount**	
Timber Harvesting:	Stand Ac	Treatment Acres
Even-Aged Management –		
Clearcutting (northern hardwood, paper birch)	132 Ac	114 Ac
Thinning	66 Ac	66 Ac
Uneven-Aged Management -		
Single-Tree Selection (approximately 25% of the stand basal area)	252 Ac	245 Ac
Group Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average and represent approximately 15% of stand acres)	621 Ac	101 Ac
Single Tree and Group Selection (groups represent approximately 12% of stand acres)	194 Ac	Groups 23 Ac Single Tree 171 Ac
Transportation:		
Pre-Haul Maintenance (Forest Roads 25, 304, 304A	5.5 Mi	
Approximate Volume	4.9 MMBF	

DOCUMENT STRUCTURE

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental effects that would result from the Proposed Action or alternatives. The document is organized into four chapters:

Chapter 1 – Purpose and Need: Chapter 1 includes information on the history of the project area, Forest Plan direction, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal (Scoping), how the public responded, and the unresolved (significant, 40CFR1501.7) issues that developed concerning the proposed action.

Chapter 2 - Alternatives: Chapter 2 details alternatives to the proposed action that were considered to meet the purpose and need for the project, both those alternatives eliminated from detailed consideration and those considered in detail. Alternatives were developed based on unresolved issues. Possible mitigation measures are included. The following tables are used to compare alternatives:

- Table 4, compares the alternatives to Forest Plan goals, identified needs, and by amounts of activity;
- Table 5, compares the alternatives by the responsiveness to unresolved issues; and
- Tables 6A-6C, compare alternatives by potential effects to resources

Chapter 3 – Affected Environment, Environmental Consequences, and Cumulative Effects: This chapter describes the environmental effects of implementing the Proposed Action or other alternatives and is organized by resource area. Each section details:
The affected environment,
The possible direct and indirect effects of the no action alternative (provides a baseline for evaluation and comparison of the other alternatives that follow) and the action alternatives on resources; and the possible cumulative effects on resources from all alternatives.

Additional information includes:

Preparers and Personal Contacts: This section provides a list of people involved in the preparation of the environmental assessment and internal and external contacts.

Literature Cited and/or Reviewed For the Environmental Assessment

Acronyms & Abbreviations

Glossary: Definition of terms used in the document.

Monitoring: A discussion of the monitoring associated with the proposed project.

Appendices: The appendices provide detailed information to support the analyses presented in the environmental assessment.

Additional documentation may be found in the project planning record located at the Pemigewasset Ranger District Office in Plymouth, NH.

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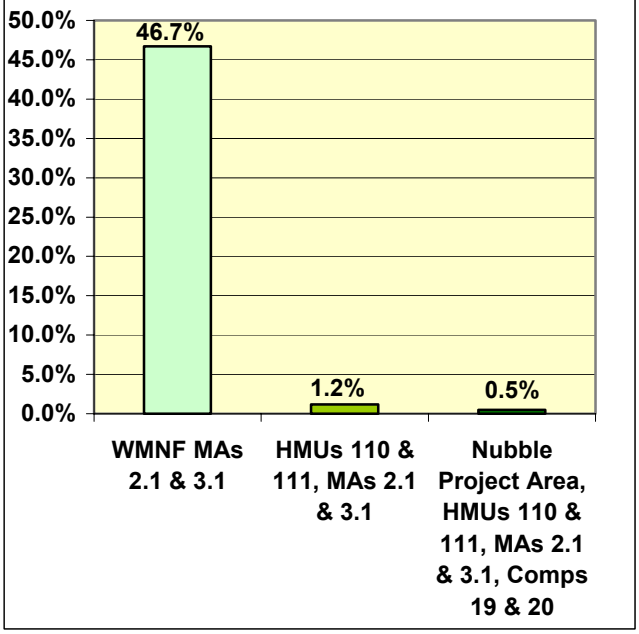
CHAPTER 1 – PURPOSE & NEED

1.0 Introduction

The Nubble Vegetation Management Project Area is located in the town of Bethlehem, New Hampshire on the Ammonoosuc/ Pemigewasset Ranger District of the White Mountain National Forest (Map 1, **Appendix A**). The Nubble Project Area is approximately 3,900 acres of federal land is divided between Management Area 2.1 and 3.1 lands (Map 3) within Habitat Management Units (HMUs) 110 and 111 (Map 2). The project area is managed using both even-aged and uneven-aged silvicultural systems.

The Nubble Project Area represents approximately 0.5% of the White Mountain National Forest. Figure 1 displays the Nubble Project Area in context of the White Mountain National Forest.

Figure 1: Nubble Project Area Lands Compared to the White Mountain National Forest Lands



The Ammonoosuc/Pemigewasset Ranger District proposes timber management and pre-haul maintenance activities in the Nubble Project Area.

The purpose of this Environmental Assessment (EA) is, after considering site-specific needs for the Nubble Project Area, to implement management direction as outlined in the White Mountain National Forest Land and Resource Management Plan (Forest Plan), as amended (USDA, 1986a). See Appendix C for specific Forest Plan goals and objectives and management area direction that pertain to the Nubble Project Area.

1.1 Background

The Nubble area has been, and continues to be, heavily used for a variety of activities. Camping at dispersed sites is popular along the Haystack Road (FR304). A parking pass system is in place that limits the number of overnight campers allowed at these established sites. A cross-country ski trail leads off the Gale River Road. Sightseeing and snowmobiling are also popular in the area.

In addition to these recreational opportunities, the area has had a long history of vegetation and wildlife habitat management. Forest Service timber harvesting dates from the 1960s to the present day. Initial timber harvesting occurred well before this date, back to the late 1800s during the railroad-logging era. Signs of these events still exist in the railroad grade along Haystack Brook and the remains of a logging camp compartment 20, stand 43.

A number of National Environmental Policy Act (NEPA) decisions have been made since 1960, which affected all or part of the Nubble Project Area (§§**1.1.1** and **1.1.2**). Some documents provided broad programmatic direction, and some documents provided for site-specific implementation of the Forest Plan.

There are no active timber sales in the immediate vicinity of the Nubble project.

1.1.1 PROGRAMMATIC DOCUMENTS

White Mountain National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986) (FEIS)

This analysis is tiered (40CFR1508.28) to the White Mountain National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, as amended (USDA, 1986) (Forest Plan).

The Forest Plan is a programmatic document, which is required by the rules implementing the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The purpose of the Forest Plan is to provide direction for the multiple use and sustained yield of goods and services from National Forest System lands in an environmentally sound manner.

The Forest Plan sets management direction for the White Mountain National Forest through the establishment of short term (10-15 years) and long-range goals and objectives throughout the year 2036. It prescribes the standards, practices, and the approximate timing and vicinity necessary to achieve goals and objectives. The Plan prescribes the monitoring and evaluation needs necessary to ensure that direction is carried out, measures quality and quantity of actual operations against predicted outputs and effects, and forms the basis for implementing revisions.

NFMA states that forest plans "shall be revised from time to time when the Secretary finds conditions in a unit have significantly changed, but at least every 15 years…. (16 U.S.C. 1604(f)(5)) ". However, Congress did not intend management to cease if the 15-year target date for plan revision was not met. NFMA, Section 1604 (c), illustrates this point. In the development of the original forest plans, Congress specifically allowed management of the forests to continue under existing resource plans pending approval of the first NFMA forest plan for each administrative unit.

A Notice of Intent to revise the Forest Plan was published February 14, 2000, and the revision process is underway. It is expected that the Final Environmental Impact Statement will be completed by December 2004.

1.1.2 SITE-SPECIFIC PROJECTS

The only previous NEPA decision made in the Nubble Project Area was Hawthorn Knob, 1984. See Appendix C, §**B.2**, for a more in depth discussion of past actions within the project area and some cumulative effects areas.

1.1.3 FORESEEABLE ACTIONS IN THE NUBBLE PROJECT AREA

There are no anticipated vegetative management projects in the Nubble Project Area within the foreseeable future (2016).

1.2 Purpose of the Proposal

The purpose of this proposed project is to implement Forest Plan direction (Appendix C, §**A**) in the Nubble Project Area by addressing site-specific needs and opportunities (§**1.4**) to move the area from the existing condition (EC) towards the desired condition (DC) (see Appendix C, §**A**). This can be accomplished by implementing activities approved in the Forest Plan (vegetation management.

1.3 Need for the Proposed Project

An interdisciplinary (ID) team (p. 76) surveyed and evaluated the Nubble Project Area. The team identified site-specific needs for natural resource management that would change or enhance the present conditions and move the project area toward the desired condition described in the Forest Plan, as amended (pp. III-30 through III-41).

There are approximately 18000 acres of federal land in HMUs 110 and 111. The proposed Nubble Project Area is located within Management Area 2.1 and 3.1 lands of compartments 119 and 120, which comprise approximately 21 percent of HMUs 110 and 111. These HMUs also contain areas that are not subject to vegetation management including management area 6.2. See Appendix E for the desired composition of MA 2.1 and 3.1 lands in HMUs 110 and 111.

The need for change is determined by comparing desired conditions in the Forest Plan with the existing conditions (EC) in the

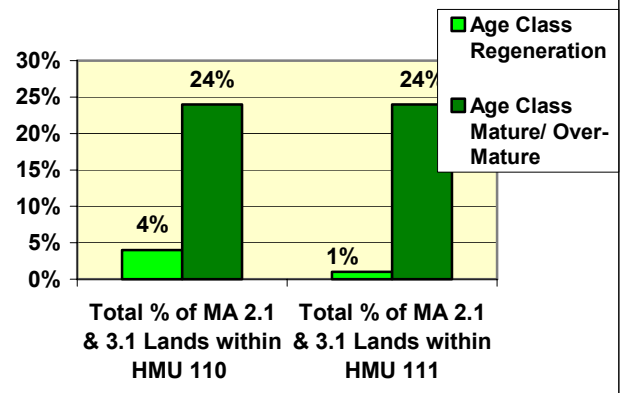
project area (Appendix C). The Forest Plan provides desired conditions for even- and uneven-aged management systems for management areas 2.1 and 3.1 and for habitat management units by even- and uneven-aged management systems. The even- and uneven-aged desired conditions apply to the Forest as a whole and are not prorated for each project area (Forest Plan, Management Area Direction, pp. III-32 & III-38).

The following list describes the "needs for change" identified for the Nubble Project Area that would meet the project's purpose of implementing the Forest Plan. It should be noted that protecting riparian values, maintaining and protecting habitat for proposed, threatened, endangered, and sensitive species, and maintaining healthy and resilient watershed into the future have been and will continue to be primary considerations in management of the Nubble Project Area.

1. At the landscape level (MA 2.1 and 3.1 lands in HMUs 110 and 111) the composition of habitat communities is weighted towards mature and over-mature forests, and there is little regenerating habitat (Figure 2). Forest Plan direction is to provide a balanced mix of habitats for all wildlife species and to increase wildlife habitat diversity for the full range of wildlife species with emphasis on early-successional species.

   Based on Forest Plan desired compositions (pp. III-13, VII-B-4, & VII-B-5; EA, Appendix C), there is a need for increased regenerating forest age class. In addition, opportunities exist, through timber harvesting and reforestation treatments, to improve the growth and vigor of forested stands. These improvements can be accomplished by harvesting mature or poor quality trees and regenerating new trees (Forest Plan, pp. III-3, III-30, III-36), and, thus, provide a variety of wildlife habitat types and conditions. Stands would be harvested in accordance with the appropriate silvicultural guidelines and Forest Plan direction. Appendix E summarizes stand conditions. Activities could include clearcutting, patch clearcutting, thinning, group selection, single-tree selection, and group/single-tree selection.

Figure 2: Percent Regeneration and Mature/Over-Mature Community Type in HMUs 110 & 111



2. There is a need to maintain an adequate transportation system for both short- and long-term access to facilitate the management of National Forest Lands and to provide motorized recreation opportunities (Forest Plan, III-31 and III-35).
3. Congress annually funds the Forest Service to provide commercial timber within the capability of the lands and individual Forest Plans. The White Mountain National Forest Plan allocates land for sustainable wood production (MAs 2.1 and 3.1, Forest Plan, III-30 and III-35). People's demand for hardwood and other wood products continues to be high, which supports the need to supply this renewable resource.

   There is a need to provide wood to meet people's demand for wood products such as furniture, paper, fiber, and construction materials. Projects such as Nubble, which supply wood products, provide a means to satisfy people's demand for wood (Forest Plan, III-3, III-30, and III-35).

1.4 Proposed Action

Table 1 displays the actions proposed by the Forest Service to meet the needs for change identified for the Nubble Project Area.

Table 1: Nubble Project Proposed Action

Activity	Amount	
Timber Harvesting:	Stand Ac	Treatment Acres
Even-Aged Management –		
Clearcutting (northern hardwood, paper birch)	132 Ac	114 Ac
Thinning	66 Ac	66 Ac
Uneven-Aged Management -		
Single-Tree Selection (approximately 25% of the stand basal area)	252 Ac	245 Ac
Group Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average and represent approximately 15% of stand acres)	621 Ac	101 Ac
Single Tree and Group Selection (groups represent approximately 12% of stand acres)	194 Ac	Groups 23 Ac Single Tree 171 Ac
Transportation:		
Pre-Haul Maintenance (Forest Roads 25, 304, 304A	5.5 Mi	
Approximate Volume	4.9 MMBF	

1.5 Decision to be Made

This environmental assessment (EA) will evaluate site-specific concerns (issues) and opportunities, consider alternatives, and analyze the effects of the activities proposed in these alternatives. This environmental assessment will provide the deciding officer (Ammonoosuc/ Pemigewasset District Ranger) with information to make an informed decisions with regard to the Nubble Vegetation Management Project and provides the basis for determining:

1. Which actions, if any, would be approved (which alternative to implement) that will move the Nubble Project Area towards the desired condition per Forest Plan direction and addresses the needs, opportunities, and issues identified for this project?
2. Is the information in this analysis sufficient to implement the proposed activities?
3. Does the proposed project have a significant impact that would trigger a need to prepare an Environmental Impact Statement?
4. What mitigation measures and monitoring requirements should the Forest Service apply to these activities to meet Forest Plan standards and guidelines for all resources?
5. Will a Forest Plan amendment be required to accommodate this project?

If an action alternative is selected, project implementation could begin in September 2003 and last for several years.

1.6 Public Involvement

The proposal was listed in the Schedule of Proposed Actions beginning 12/01.

A scoping letter was mailed to approximately 270 interested parties on February 25, 2002.

Five (5) individuals commented on the proposed action during the formal scoping process. Comments were used to define unresolved (significant) issues, to develop alternatives, and to analyze effects.

1.7 Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of additional comments may be found in Appendix B – Public Involvement.

The Forest Service identified the following significant issue during scoping:

The age class distribution within management area 2.1 and 3.1 lands in even-aged management for HMUs 110 and 111, following the proposed vegetative management activities, will not reflect the "ideal" HMU specified in the Forest Plan (p III-13) ***(Public, Agency Issue)***.

The measure used to evaluate how the alternatives address this issue will be how closely the predicted habitat community/age class for management area 2.1 and 3.1 lands within HMUs 110 and 111 compares to the desired composition for and "ideal" HMU in the Forest Plan (LRMP, p III-13).

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CHAPTER 2 - ALTERNATIVES

2.0 Introduction

This chapter includes a description and comparison of alternatives considered for the Nubble Project. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., clearcutting versus patch clearcuts), and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

If an action alternative is implemented, actual amounts of activities accomplished on the ground (measured in acres or miles) may differ slightly from estimates in this EA. All variances would be evaluated to ensure that any effects are within the parameters of the effects analyzed in this document and would be documented in the Nubble project file.

Table 1, Appendix C, provides a detailed comparison of Alternatives 2 and 3 by individual stand treatments and harvesting season.

2.1 Alternatives

Management techniques, based on silvicultural science, can be used to change vegetation in a project area. The types of management activities proposed are dependent on the current conditions: forest types and other resource conditions such as soils and topography.

2.1.1 Alternative 1 – No Action

Under Alternative 1, current and on-going management activities would continue, but no new, federal vegetation management activities would be initiated during this entry. Changes might occur through current management direction (such as road maintenance), natural processes, or other management decisions in the future. This alternative provides a foundation for describing and comparing the magnitude of environmental changes associated with the action alternatives against those changes that occur naturally or during routine operations. This alternative responds to those who want no vegetation or wildlife habitat management to take place.

Please refer to §**3.1.4** for a summary of the existing road system that would continue to be maintained in the Nubble Project Area under this alternative.

2.1.2 Alternative 2 – Proposed Action

Alternative 2 is the Proposed Action that was scoped during February of 2002. Map 4 (Appendix A) displays the activities proposed under Alternative 2. Table 2 lists the activities proposed in Alternative 2.

The Proposed Action is a collection of possible vegetative treatments that meet acceptable silvicultural practices, follow Forest Plan standards and guidelines, and have a high probability of successfully achieving the desired condition for wildlife habitat.

Alternative 2 uses established silvicultural techniques to achieve the desired vegetative condition for wildlife habitat while giving equal importance to other resource values (visual and recreation).

2.1.3 Alternative 3

Alternative 3 responds to the issue of more closely meeting Forest Plan desired composition of age class goals for management area 2.1 and 3.1 lands in HMUs 110 and 111. This alternative aggressively uses established silvicultural techniques to more closely achieve Forest Plan desired condition for early-successional habitat with less emphasis on resource values (visual and recreation). Map 5 displays Alternative 3. Table 3 lists the activities proposed in Alternative 3.

2.1.4 Mitigation Measures for Alternatives 2 & 3

In addition to the generally applicable Forest

and Management Area-wide Standards and Guidelines listed in the Forest Plan in sections III and Appendix VIIB, pp. 18-22 see individual resource sections in Chapter 3 and **Appendix D – Mitigation Measures** for a full list of mitigation measures that would be used in implementing Alternatives 2 or 3.

Table 2: Alternative 2 – Proposed

Activity	Amount	
Timber Harvesting:	Stand Ac	Treatment Acres
Even-Aged Management –		
Clearcutting (northern hardwood, paper birch)	132 Ac	114 Ac
Thinning	66 Ac	66 Ac
Uneven-Aged Management -		
Single-Tree Selection (approximately 25% of the stand basal area)	252 Ac	245 Ac
Group Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average and represent approximately 15% of stand acres)	621 Ac	101 Ac
Single Tree and Group Selection (groups represent approximately 12% of stand acres)	194 Ac	Groups 23 Ac Single Tree 171 Ac
Transportation:		
Pre-Haul Maintenance (Forest Roads 25, 304, 304A	5.5 Mi	
Approximate Volume	4.9 MMBF	

Table 3: Alternative 3 – Proposed

Activity	Amount	
Timber Harvesting:	Stand Ac	Treatment Acres
Even-Aged Management –		
Clearcutting (northern hardwood, paper birch)	435 Ac	305 Ac
Patch Clearcutting (patches range in size from 4 to 5 acres in size and represent approximately 18% of stand acres)	136 Ac	24 Ac
Thinning	166 Ac	106 Ac
Uneven-Aged Management -		
Single-Tree Selection (approximately 25% of the stand basal area)	242 Ac	237 Ac
Group Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average and represent approximately 15% of stand acres)	502 Ac	78 Ac
Single Tree and Group Selection (groups represent approximately 12% of stand acres)	168 Ac	Groups 32 Ac Single Tree 148 Ac
Transportation:		
Pre-Haul Maintenance (Forest Roads 25, 304, 304A	7.0 Mi	
Approximate Volume	7.2 MMBF	

2.2 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the tables is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

The allocation of lands within management areas 2.1 and 3.1 to even- and uneven-aged management would not be affected by activities proposed in Alternative 2. However, Alternative 3 proposes to change 97 acres that are currently allocated to even-aged management to an uneven-aged system using group selection.

This section displays the comparison of alternatives using several criteria:

- Table 4, compares the alternatives to by Forest Plan goals, identified needs, and amounts of activity;
- Table 5, compares the alternatives by the responsiveness to unresolved issues; and
- Tables 6A-6C, compare alternatives by effects to resources.

For a comparison of Alternatives 2 and 3 by individual stand treatments and harvesting season see Appendix C, Table 1.

Table 4: Comparison of Alternatives to Forest Plan Goals, Identified Needs, and by Amounts of Activity

Activity	Forest Plan Goals[a]	Need[b]	Alt 1 No Action	Alt 2 Proposed Action		Alt 3	
Timber Harvesting:				Stand Ac	Treatment Acres	Stand Ac	Treatment Acres
Even-Aged Management –							
Clearcutting (northern hardwood, paper birch)	a, b, f, g, h, k, l, m, n, o, r, s	1, 3	0 Ac	132 Ac	114 Ac	435 Ac	305 Ac
Patch Clearcutting (patches range in size from 4 to 5 acres in size)	a, b, f, g, h, k, l, m, n, o, r, s			0 Ac	0 Ac	136 Ac	24 Ac (18%)
Thinning	a, b, g, h, k, m, n, r, s			66 Ac	66 Ac	166 Ac	106Ac
Uneven-Aged Management							
Single-Tree Selection (approximately 30% of the stand basal area)	a, b, g, h, k, m ,n ,r	3	0 Ac	252 Ac	245 Ac	242 Ac	237 Ac
Group Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average)	a, b, g, h, k, m ,n ,r			621 Ac	101 Ac (16%)	502 Ac	78 Ac (15%)
Group/Single-Tree Selection (groups range in size from 1/10 to 2 acres in size; ½ acre average)	a, b, g, h, k, m ,n ,r			194 Ac	Groups 23 Ac (12%) Single Tree 171 Ac	168 Ac	Groups 20 Ac (12%) Single Tree 148 Ac
Transportation							
Pre-haul Road Maintenance (Forest Roads 25, 304,304A	a, b, c, d, j, p	2	0 Mi	5.5 Mi		7.0 Mi	
Approximate Volume	g, h, k, n	3	0 MMBF	4.9 MMBF		7.2 MMBF	

[a] See Forest Plan Goals listed in Appendix C

[b] See Needs, §1.3 above.

Table 5: Comparison of Alternatives by Responsiveness to Unresolved Issues

Issue	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
The Proposed Action does not move the Nubble Project Area as close to the Forest Plan desired composition of age classes as it could. (Agency Issue). A measure used to evaluate this issue will be how closely the predicted habitat community/age classes for management area 2.1 and 3.1 lands in HMUs 110 and 111 compares to the desired condition for an "ideal" HMU (LRMP, p III-13).	Habitat composition moves futher away from HMU objective because young component grows and is not replaced with new, early-successional vegetation.	Proposed action moves partialy toward the desired future condition. Two percent of nothern hardwoods and paper birch would be regenerated vs 10% desired condition. Is sensitive to heightened visual values and recreational activities.	Meets and slightly exceeds the 10% target with 11% northern hardwood and 14% birch regenerated. Is not as sensitive to visual values and recreational activities.

Table 6A: Comparison of Alternatives By Effects to the Physical Environment

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Soils - §3.1.1	Surface soil erosion will not change on the forest development roads in the project area. Permanent soil compaction will exist on these roads, as anticipated in the 1986 Forest Plan FEIS.		
	Skid trails associated with previous timber sales in this project area are generally overgrown and/or covered with leaf litter, thus minimizing the impact of raindrop splash, which can be a precursor to soil erosion.	Soil erosion on major skid trails used in the winter will be limited to minor, site specific effects. The stands where timber harvesting can occur during dry summer or fall periods may experience soil erosion on the main skid trails as surface soil organic matter is compacted or eroded during the operation. Overall, harvesting could lead to a marginal increase in soil erosion in the project area. To limit possible effects of soil erosion, skid trails would be seeded, mulched, and water-barred as soon as they are no longer in use.	
	No change in soil erosion is anticipated from hiking trails or dispersed campsite use.		
Water - §3.1.2			
Water Resource	No new effects	Because the mitigations would be used regardless of the action alternative selected, long-term direct and indirect effects to streams and riparian are not expected to occur fromr any of the action alternatives. Effects related to the reopening of roads, skid trails, landings, and creation of upland dispersed sites are unlikely to occur. All alternatives had levels of 1.2% or less within the subwatershed, well below the 10% level where effects began to be evident in the referenced summary (May and others, 1997). In addition, many of the same mitigations outlined above will also work to reduce the effect of compacted impervious surfaces on the water balance. Overall, there would be little or no effects from water yield increases related to roads, skid trails, landings, and dispersed sites in any of the action alternatives. Effects of cutting on flows tend to be localized and are unlikely to extend beyond first or second order streams in well-managed forests, where relatively small portions of the watershed are being harvested at a given time.	

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Air Quality - §3.1.3	No new effects	Because of the limited duration of operation of harvesting equipment, it is unlikely that the proposed activities would exceed the NAAQS. Since ground-level ozone is the worst during summer months, any fall or winter harvesting would minimize this effect so that ozone is unlikely to form at elevated levels as a result of proposed activities.	
Transportation - §3.14	No new effects	Pre-haul maintenance of 5.5 Mi	Pre-haul maintenance of 7.0 Mi
		Approximately 19 landings. Sixteen (16) of the landings are already in place. Some trees and saplings would need to be cleared before the existing landings can be used. The remaining Three (3) landings would need to be constructed.	Up to 21 landings. Seventeen (17) of the landings are already in place. . The remaining four (4) landings would need to be constructed.

Table 6B: Comparison of Alternatives by Effects to the Biological Environment

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Vegetation - §3. 2.1	Paper birch that is in the over-mature age class is becoming decadent and may convert to northern hardwoods. There would be no early-successional habitat. *Forest Plan DCs for diversity of habitat community and age/size class would not be met*. There would be less overall species diversity. There would be no direct or indirect effect to herbaceous vegetation.	45 acres of paper birch that is in the over-mature community stage is becoming decadent would be regenerated. This would help existing, limited community type diversity. In addition, 69 acres of northern hardwood would be regenerated. *These activities would help meet Forest Plan DCs for diversity of habitat community and age/size class.* Uneven-aged management proposed on 540 acres. Regeneration from group selection would tend toward a broader mix of shade-intolerant, intermediate and shade tolerant species. Single-tree selection would eventually tend towards stands of beech, sugar maple, and hemlock. Clearcutting would have effects on herbaceous vegetation up to 100 feet into adjacent stands. Some species would increase following harvesting. Within 30-50 years, the understory environment would return to pre-harvest conditions. There would be less impact to herbaceous vegetation from uneven-aged mngt.	106 acres of paper birch that is in the over-mature community stage is becoming decadent will be regenerated. This would help existing, limited community type diversity. In addition, 232 acres of northern hardwood would be regenerated. *These activities will help meet Forest Plan DCs for diversity of habitat community and age/size class.* The effects would be the same as Alternative 2, except that there would be 329 acres of clearcutting and 483 acres of uneven-aged management. *These activities would help meet Forest Plan DCs for diversity of habitat community and age/size class.*
	Most trees would grow to larger size. Many trees would decline, lose commercial value, and die. Coarse, woody material would increase on the forest floor.	Declining trees would be salvaged and used for forest products. 93 acres of mature but high quality hardwoods a deferred from clearcutting to continue growth of quality saw timber.	Declining trees would be salvaged and used for forest products. 93 additional acres of early-successional habitat created.

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
	diversity	Deferring the regeneration of a 15 acre, low quality stand would encourage conversion to softwood type Deferring the regeneration of a 15 acre, two age stand Would protect existing high quality regeneration.	30 additional acres of early-successional habitat created.
Terrestrial Wildlife Resources -§3.2.2	A direct, adverse effect would be continued lack of habitat diversity in the early-successional age class in northern hardwood forest type. Indirect adverse effects include a potential decline in MIS diversity that favor early-successional habitat, and long-term loss of the paper birch and aspen community types.	A direct effect would be the creation of large openings and increased age class diversity, which is beneficial to the majority of MIS. Indirect effects would be a reduction in closed canopy conditions in harvest units, which would not benefit the lesser number of MIS that favor this condition.	Similar direct and indirect effects described under Alternative 2 would occur. However, Alt 3 has more opportunity to increase early-successional age class diversity and perpetuate paper birch and aspen community types due to more acres of clearcutting and more total stand acres treated.
Aquatic Resources - §3.2.3.	No direct or indirect effects to riparian, amphibian, reptile, and fish habitat. However, there would be adverse indirect and cumulative effects to amphibian and reptiles due to a lost opportunity to open the forest canopy to allow light and solar warmth to the forest floor and increase early-successional habitat. These microhabitats support various invertebrate insects, which are prey base for amphibians and reptiles.	There would be a low potential for relatively minor, localized and short-term direct and indirect effects to amphibian, reptile and fish habitat as related to sediment, turbidity, and travel impediments and displacement.	There would be a slightly increased potential for similar relatively minor, localized and short-term direct and indirect effects to amphibian, reptile, and fish habitat as described under Alt. 2 but to a greater degree because of more clearcutting and overall increased number of acres proposed for treatment.

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Biological Diversity - §3.2.4.	A direct, adverse effect would be a continued decline in horizontal, vertical, and vegetative species diversity in the early-successional regeneration age class. Indirect adverse effects overtime would be a potential decline in overall biodiversity at the stand scale due to the lack of regeneration age class and loss of paper birch / aspen types. And a decline the associated MIS and general wildlife species favoring this habitat within the project area. There would be no direct or indirect effects to aquatic biodiversity or recreational fishing opportunities within the Nubble project area.	None of the action alternatives would cause forest fragmentation, but would cause relatively minor, localized, and temporary effects of conversion of vegetation age class and species composition that would result in neutral shifts in biodiversity at the stand scale within the Nubble Project Area. However, there would be no overall loss in aquatic or terrestrial vegetation or wildlife species biodiversity within the Nubble Project Area.	

Table 10C: Comparison of Alternatives by Effects to the Biological Environment

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Cultural Resources - §3.3.1.	Current level of public visitation may result in some impacts to sites that will be addressed by standard Forest Service cultural resource and law enforcement policy.	White Mountain National Forest works in consultation with the NH State Historic Preservation Office to design projects that are determined to have no effect upon cultural sites in accordance with 36 CFR 800 and The National Historic Preservation Act of 1966, as amended. The Forest Service received a letter (8/29/02) from the Deputy State Historic Preservation Officer with a "no adverse effect" determination for the proposed Nubble project with regard to cultural sites (EA, §**3.3.2.3**). Current level of public visitation may result in some impacts to sites that will be addressed by standard Forest Service cultural resource and law enforcement policy. Known sites within the project area would be avoided during layout, marking, and logging operations. Avoidance and site mitigation measures are designed to eliminate or lessen any impacts to heritage sites or site values from timber harvesting. The Little River Railroad Grade would be crossed by a skid trail that would be done over snow cover and/or frozen ground conditions. Sites will be protected and avoided during logging operations. Mitigation measures for over snow and/or frozen ground would stop or appropriately minimize impacts to the railroad grade. If the mitigation measures are followed, no effects to cultural resource sites in the Nubble Project Area are anticipated. Mitigation would include the development of a cultural resource implementation plan.	

Resource	Alt 1 – No Action	Alt 2 – Proposed Action	Alt 3
Recreation - §3.3.2	Current level of recreation would continue with out interruption. .	At times during the timber sale snowmobile trails will be rerouted to alternate locations, interrupted by speed restrictions, stop signs or flag men. Sections of loop trails may be temporarily closed. At times portions of the cross country ski trail may be crossed by skidding equipment on week days or portions of loops may be closed temporarily while logging is in progress. Visitors camping at dispersed locations on FR 25 or 304 may see and hear logging or hauling activities on week days between 8 am and 5 pm.	The disturbances or interruptions in recreational activities would be similar but slightly increased in Alternative 3.
Visual Quality - §**3.3.3**	There would be less visual diversity along trail corridors. There will be less visual disturbance seen from various view points.	Visual diversity, including vistas would be improved along the ski and snowmobile trail Visual disturbances will be mitigated so that they are evident but not dominant.	Visual diversity, including vistas would be improved along the ski and snowmobile trail. Additional disturbance will be mitigated but visible beyond what is needed for diversity. Visual disturbances will be mitigated only to meet minimum Forest Plan Standards. Some treatments will be prominent as seen from distant view points.
Community, Environmental Justice, & Economics - §3.3.4.	No revenues or employment benefits would be generated form timber harvesting	All treatment acres would have revenues that are higher than preparation costs. Also product value exceeds logging costs	Of the 151 acres of additional harvest, 50 acres have marginal return to the government because of high logging cost and modest timber value that would be reflected in the bid price.
	Cash Flow: Net Return to Federal Treasury by Alternative for Nubble Project (Revenue – Cost = Net Return)		
	$0 - $238,140 = -$$238,140 (no revenue, only planning costs)	$980,000 – $442,651 = $537,349	$1,365,000 - $538,646 = $826,354
	Anticipated 25% fund, Grafton County		
	$0	$245,000	$341,250
	Timber tax revenue to the town of Bethlehem		
	$0	$98,000	$136,500.

CHAPTER 3 - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES

3.0 Introduction

The Nubble Vegetation Management Project Area is located in the town of Bethlehem, New Hampshire on the Ammonoosuc/Pemigewasset Ranger District of the White Mountain National Forest (see Map 1, **Appendix A**). The Nubble Project Area consists of approximately 3,900 acres of federal lands. Chapter 3 displays the current condition of the resources within the project area and the analysis of direct, indirect and cumulative effects of alternatives for the Nubble Vegetation Management Project. It also presents the scientific and analytical basis for comparison of alternatives presented in the Chapter 2 above.

In this chapter, the following font types are used to distinguish between the discussion of affected environment and environmental effects.

- Affected Environment and Mitigations
- Direct/Indirect and Cumulative Effects

3.0.1 Forest Plan References to Cumulative Effects.

This environmental assessment is tiered to the Forest Plan FEIS, (USDA, 1986) in which some of the cumulative effects have been previously discussed. These disclosures of potential cumulative effects have been reviewed during the site-specific analysis performed for this project and are consistent with site-specific effects

Recreation	pp. IV-58 to IV-59
Roads	p. IV-59
Timber	p. IV-60
Visual	pp. IV-60 to IV-62
Wildlife	pp. IV-62 to IV-64
Economic Resources	p. IV-64
Community Well-Being	pp. IV-65 to IV-66
Soils and Water	p. IV-66
Air Quality and Noise	p. IV-66
Cultural resources	p. IV-66

3.0.2 General Cumulative Effects

Cumulative effects consider the impacts of proposed projects on a landscape scale across time and space. Cumulative effects analysis examines the effects of other activities, on National Forest and private land that may occur across the landscape but may not readily be apparent at a smaller scale.

Cumulative effects will be analyzed under each resource area. The reason for choosing specific cumulative effects criteria will be explained in the individual cumulative effects analyses.

3.1 Physical Environment

3.1.1 Soils

3.1.1.1 Soil Affected Environment

The Nubble Project Area has soils common to many other areas across the White Mountain National Forest. At elevations generally below 2,500 feet, the soil is mainly deep, well- and moderately-well drained, sandy loam tills on 10-25% slopes. These soils correspond to the areas of "suitable" land base where planned timber management is allowed on the Forest (MA 2.1 and 3.1 lands). All of the Nubble Project proposed activities are in this zone. At higher elevations, the soils are either deep, or shallow tills to ledge. All soils other than those where there are all-season roads are under a closed forest canopy that intercepts rainfall and prevents initiation of soil erosion.

On the Forest, soil hazards that may occur include dry debris slides, deep soil slumps, and surface soil erosion. In the Nubble Project Area, and in Gale River, Haystack, and Little River subwatersheds, dry debris slides are not a risk, because the ecological land type with very steep slopes and thin, gravelly soil where these may occur, does not exist here. Deep soil slumps occur on very steep banks along major rivers and streams where there is poorly graded, very fine sandy-loam that has slight plasticity. These "break land" ecological types also do not occur in the affected subwatersheds. Therefore, surface soil erosion is the possible impact of interest for this proposed project.

Roads and skid roads are the main concern for soil erosion because they expose mineral soil that may erode (Patric). The mere act of cutting trees is not a source of soil erosion, because it does expose mineral soil (Hornbeck).

The main roads leading to the project area are

the Gale River Road North and the Haystack Roads. Both are all-season gravel roads that have been in place for many years. They are well maintained, cut-banks are stabilized, and there is no evidence of accelerated soil erosion (ruts and channels). Both roads experience brief periods of sheet erosion. However, seasonal road closures, properly maintained ditches, and permanent drainage structures, reduce soil erosion (sheet, not channel) to the immediate corridor of the road.

Existing log landings (17) from previous sale activities are well located, stabilized, and do not show signs of soil erosion based on field inspection. The approximately 14 acres of existing skid trails are also stabilized, including water-bars, or seeded with grass, and show no evidence of accelerated soil erosion.

The same is true for the 6.5 miles of snowmobile trail that traverse this area.

Roadside camping along the Haystack Road is on well-defined, flat sites that are seasonally open and do not experience accelerated soil erosion.

Cross-country ski trails near Route 3 are well vegetated, drainage is installed where necessary, and no accelerated soil erosion is occurring.

In short, minimal evidence of soil erosion in this vicinity supports research findings that soil erosion (and sedimentation) at managed forestry operations can be controlled with timely application of standards the guidelines (Martin et al). It is also consistent with other findings about soil erosion in Eastern Forests, where it is reported that forestland can be managed so there is little or no increase in soil erosion (Patric). Timber sale inspection reports from previous sales support that soil erosion has not been an issue (Hagan). The last timber sales in this vicinity began in the mid-1980s, and were completed in the early 1990s.

Potential indirect impact from soil erosion is stream sedimentation. This is described in detail in the Water Resources effects discussion. In summary, however, water quality monitoring during many years of road construction, skidding and timber harvest, particularly in the municipal watershed of the Town of Littleton Municipal Water Supply area (see §**3.1.2.1** for a more detailed description) , has not revealed soil erosion leading to stream turbidity that surpasses State standards (Hagan).

3.1.1.2 Soil - Related Mitigation Measures

All applicable Forest Plan standards and guidelines would be met. There are no additional project-specific mitigation measures.

3.1.1.3 Direct and Indirect Effects on Soil

Alternative 1- No Action

Harvesting is deferred on National Forest lands suitable for timber harvest (as described in the LRMP) within the project area until some later time. Dispersed campsites located on the Haystack Road will continue to be used, as will be cross-country ski and snowmobile trails.

Surface soil erosion will not change on Forest Development Roads 25, 304, and 304A. It will be at a low rate, similar to that which already occurs. As has been the case in the past, it may be slightly greater immediately after annual road grading done for maintenance purposes. Forest Roads 25, 304, and 304A will continue to experience minor, site-specific, localized, surface soil erosion.

Accelerated soil erosion is not likely to occur. These roads were built or are managed according to the standards and guidelines of the 1986 Forest Plan, which were devised to minimize soil erosion. These practices have been used effectively since the early 1970s. Permanent soil compaction will exist on these road locations, as anticipated in the 1986 Forest Plan FEIS. Skid roads associated with previous timber sales in this watershed are generally overgrown and/or covered with leaf litter, thus minimizing the impact of raindrop splash, which can be a precursor to soil erosion.

In the short term, no change in soil erosion is anticipated from hiking trails, dispersed campsite use cross country ski trails or snowmobile trails. These locations experience limited, site specific and short-term soil erosion. Compacted surfaces at these locations will remain in place.

Alternative 2

The effects of Alternatives 2 and 3 are essentially the same for both action alternatives concerning potential sources of soil erosion or compaction (permanent roads, main skid trails, campsites, and trails). With regard to the timber, the season of harvest is the same for all stands proposed for management in both alternatives. Differences between methods of harvesting, even- vs. uneven-aged management, do not substantially alter the density of main skid roads. The location of roads and main skid trails does not vary among action alternatives. In short, the alternatives

were not specifically formulated to resolve issues of soil erosion and compaction.

Direct Effects

Pre-haul maintenance of all-season roads (5.5 miles) will briefly increase the risk of sheet erosion. However, well-maintained ditches and culverts on properly designed roads with environmentally safe outlets for surface water will minimize effects because the volume, and discharge of water will not initiate accelerated soil erosion.

Short, temporary roads to access a variety of log landings near the all season gravel roads may experience sheet erosion when mineral soil is exposed, and ruts may sometimes appear from truck use. However, the short length, temporary drainage, and gentle to moderate slopes on moderately well-drained soils will lead to little or no sheet or accelerated soil erosion.

Skidding would affect an estimated 30 acres, all within the slope guidelines of the 1986 Forest Plan. Site-specific field examination has limited skidding to winter-only on 513 stand acres (or about one-half the skid trails) where soils are mainly moderately well-drained tills over hardpans, and, therefore, have a high soil erosion hazard. The erosion hazard for the applicable soils appears in the 1986 Forest Plan (VII-F-3).

Summer or fall harvest is planned on the remaining 753 stand acres. This skidding is mainly on well-drained soil on mountain side-slopes with moderate to high surface soil erosion hazard. Site-specific field experience in the vicinity of the winter and summer or fall harvest areas has demonstrated that, because of careful attention the location, slope, and applicable season of harvest based on soil drainage, accelerated soil erosion has either not occurred or has been limited to short stretches of skid trails. This is consistent with the effects estimated in the 1986 Forest Plan FEIS (IV-30-32).

Log landings are not considered a significant source of soil erosion. Landings are small (average ¼ acre), generally on flat, well-drained soils, away from streams, and with concentrations of bark and branches that limit the possibility of soil erosion (CFRU Information Report 38).

In Alternative 2, 16 previously used landings and three new landings will be used. While there can be substantial churning of the exposed mineral soil, especially with summer and fall harvesting, their small size, careful location and consideration of surface drainage patterns limits the possible magnitude of soil erosion to on-site re-distribution of soil. All landings are re-shaped after use, and stabilized with seed, fertilizer and lime, if needed, to prevent erosion after the sale is closed.

Indirect Effects

The indirect effect on soil is possible stream sedimentation. See the Water and Aquatic sections for a discussion water quality.

Alternative 3

This alternative differs from Alternative 2 by treating 198 more acres (720 vs. 918). It includes 1.5 miles more of pre-haul road maintenance (5.5 vs.7.0), 7 more acres of estimated skidder impact (25 vs. 32) and four more log landings (19 vs. 21). The percent of winter-only harvesting is slightly greater than Alternative 2 (48% vs. 41%).

The sources of soil erosion, and magnitude and duration of impact, are essentially the same as Alternative 2. This is because the transportation system is nearly identical, and, as stated above, roads and skid trails are the main potential source of soil erosion. The pre-haul maintenance will still result is some sheet erosion, but for the same factors previously discussed, this effect is short term. No accelerated soil erosion is anticipated from skid trails or log landings, also for the same reasons already discussed in Alternative 2. In short, there is no soil, topographic or surface water drainage factors that are significantly different, or present extraordinary risks, with the additional activity planned in Alternative 3. Both subwatersheds, which have a history of land use including timber management, are deep, moderate or well-drained soils well within the scope of conditions anticipated in the 1986 Forest Plan for timber management.

3.1.1.4 Cumulative Effects on Soil

The Gale River, Haystack, and Little River subwatersheds are the analysis area for soil erosion cumulative effects. These cumulative effects areas were chosen, because eastern forests generally have deep, well-drained soils, and, as a result, soil erosion is limited to the area in which activities occur (Patric). Past activities include: timber sales, skidding and harvesting in approximately the past twenty years; construction or brushing of the snowmobile and cross-country ski trails and construction of the Beaver Brook Roadside Parking Area; and clearing for dispersed camping along the Haystack Road. No future timber sales or recreation projects are planned on federal lands at this time. The last timber sales in these watersheds began in the mid-1980s and were closed in the early 1990s.

Ongoing and future soil-disturbing activities on private lands in the subwatersheds include roadwork (including road re-construction of Route 3 by the New Hampshire Department of Transportation – NHDOT), a minor amount of housing construction, and timber harvesting. It is not known what amounts of these activities would occur in the future, but the activities would be restricted to private land. However, all activities are required to follow State of New Hampshire Best

Management Practices or regulations to protect soil and water resources.

The NHDOT Route 3 project is reshaping roadside shoulders. Use of BMPs is mandatory, including progressively stabilizing soils (mulching) and re-vegetating the areas as work progresses.

Alternative 1 - No Action

Sheet soil erosion has occurred from all the above-mentioned activities, because there is always a period before soils are stabilized when it may erode. As mentioned earlier, roads are the main concern. It is well known that the soil erosion impact is greatest during the first twelve months after a road is built (Stone). There is no on-site evidence based on field inspection, however, that accelerated soil erosion from all sources has occurred or is occurring. This is because the roads and skid trails are properly designed, located, and maintained for use.

This includes attention paid to season of harvest. In addition, field inspection reveals that all previous harvest areas have re-vegetated to a thrifty forest, including those locations that were clear-cut harvest. Skid trails are leaf covered, the forest canopy has overgrown the skid trails, and they do not show evidence of chronic soil erosion, such as erosion channel development. Overall, therefore, the cumulative soil erosion impact is short-term sheet erosion at limited locations that has occurred when mineral soil was exposed during earlier actions.

Snowmobile trails, cross-country ski trails, and roadside camping are unchanged. No effects were anticipated in the Nubble Project Area from soil erosion, and no cumulative effects are anticipated from Alternative 1.

Alternative 2

Exposure of mineral soil is mainly from the 0.9 mile of short spur roads to access log landings, re-opening of log landings, use or re-use of skid trails, and continuation of re-construction of Route 3. As in the No Action Alternative, snowmobile trails, cross-country ski trails, and roadside camping are unchanged. Given the attention paid during planning (season of harvest and skid trail and log landing locations; drainage of surface water on temporary roads and all-season roads; and, provision for sale administration according to Forest Plan standards and guidelines), cumulative soil erosion will be limited mainly to short-term sheet erosion on permanent and temporary roads, plus some channel or ruts at log landings. While the potential risk of soil erosion is greater than the No Action Alternative, the on-the-ground history of logging since the 1980s does not indicate soil erosion will be a significant concern when best management practices are properly applied.

Alternative 3

Cumulative impacts are also similar to Alternative 2. Alternative 3 presents no significant change in the magnitude, duration or intensity of activity that might lead to surpassing some threshold leading to greater soil erosion, especially a shift from sheet to accelerated erosion. No extraordinary soil conditions occur at the sites of additional activity in this Alternative. The density of permanent and temporary roads is remains low. As in Alternative 2, sheet erosion may occur on permanent, all season roads, when they are maintained. It may also occur on temporary roads, skid trails and log landings. Therefore, soil erosion will be limited when best management practices are applied. The potential for soil erosion is greater than Alternative 2, but the practical difference is marginal, at best.

3.1.2 WATER RESOURCES

3.1.2.1 Water Resources Affected Environment

See also the Soil Resource section (**3.1.1**) for a discussion of the physical attributes of soil erosion as they relate to water resources.

The Nubble Project Area is located in portions of the Haystack Brook, Little River, and the Gale River subwatersheds. Haystack Brook and Little and Gale Rivers are tributaries of the Ammonoosuc River.

The New Hampshire Department of Environmental Resources lists Haystack Brook and Little and Gale Rivers as Class A, which indicates the highest water quality classification: no discharge of sewage or waste is allowed into the waters of this classification. The water is considered usable as a source of drinking water after adequate treatment.

The Littleton Town Water Supply occupies approximately 9,564 acres in the headwaters of the Gale River. The intake and reservoir are on a 16-acre parcel (along FR25) owned by the Littleton Water and Light Department (map in project file). Approximately one quarter of the Nubble Project (southwest portion) is within the municipal watershed.

Timber harvesting has been an ongoing part of management in this Nubble Project Area as well as in the larger subwatersheds. Past timber harvesting in the project area concluded in the early 1990s. Landings and skid roads associated with previous timber sales in this subwatershed are generally overgrown and/or covered with

leaf litter, thus minimizing the impact of raindrop splash, which can be a precursor to soil erosion and indirectly to stream turbidity.

There are snowmobile and cross-country ski trails and locally dispersed campsites in the project area. These locations experience limited, site specific and short-term soil erosion. Compacted surfaces at these locations will remain in place. In the short term, no change in soil erosion is anticipated from hiking trails, dispersed campsite use, cross country ski trails or snowmobile trails. Therefore, no affects to water quality (turbidity) are expected.

3.1.2.2 Water Resources - Related Mitigation Measures

Forest Plan standards and guidelines and best management practices (BMPs) would be followed with regard to all activities.

- Designate major skid trails and minimize the number of stream crossings.
- When water quality could be effected, use winter harvesting where feasible.
- Close roads to use and hauling in wet seasons. Maintain drainage structures, filtering areas, decelerators and sediment traps.

3.1.2.3 Direct and Indirect Effects on Water Resources

Alternative 1

There would be no direct or indirect effects on water quality from implementation of Alternative 1 (No Action) than those that may already be naturally occurring. The current condition would remain. Streams and riparian areas would continue to function much in the same way as present.

Alternatives 2–3

Approximately one-quarter pf the Nubble Project Area is in the municipal watershed. In Alternative 2 there are approximately 56 acres of proposed treatment, 1.9 miles of FR 25, and potentially 4 landings. The difference between Alternative 2 and 3, is that there are approximately 135 acres of treatment proposed. Activities proposed in the Nubble Project, similar to those that have preceded it, would be implemented in accordance with the Memorandum of Understanding between the Littleton Water and Light Department and the Forest Service (Project file).

A timber sale contract clause would require a purchaser to provide a Hazardous Substances Plan. The plan covers safe storage of oil or fuel in the sale area and notification and clean up requirements in case of a spill. In addition, the White Mountain National Forest has a Hazardous Materials Incident Response Plan (2003). The purchaser would be required to review the plan annually and provisions listed in the plan would be enforced by periodic inspections.

Alternatives 2 and 3 involve pre-haul road maintenance, installation of temporary pipe culverts and skidder bridges, felling and skidding of trees, use of landings and timber hauling. There is a low risk of affecting water quality during these activities. Potential effects would be mitigated using BMPs, as well as the standards and guidelines of the 1986 LRMP and in addition to mitigations listed in Appendix D.

Because mitigations (BMPs and standards and guidelines) would be applied regardless of the action alternative, long-term direct and indirect effects to water resources are not expected to occur. Potential effects are avoided through the use of buffers and treatment restrictions around streams and riparian areas and designated stream crossings. Buffers for perennial streams in the project area have been incorporated.

Under both action alternatives trees would be felled away from streams and riparian areas to reduce effects that might result from the felling operation and skidding the downed tree. Logging debris would be kept out of riparian areas and streams with defined channels, and existing woody material would be left in place.

Differences between even-aged and uneven-aged management do not substantially alter the density of main skid trails (§**3.1.2**). Alternative 3 proposes to harvest more units than Alternative 2, and would have more skid trails. Where the two alternatives share common harvesting units, the location of roads and main skid trails does not vary.

There is low risk of short-term, minor effects to water resources associated with temporary stream crossings, landings, and temporary roads. The potential disturbance related to these activities varies according on the season of harvest and the number of units proposed for harvesting. Disturbance in winter is lower because of frozen ground conditions and snow pack. The season of harvest is the same for treatments that appear in each alternative. The potential effects to water resources can be measured by the following indicators:

1. The total acres of ground disturbance from landings, skid trails, and temporary roads (discussed in more detail in (§**3.1.1**), and

2. The number of stream crossings.

Temporary stream crossing locations are where short term, minor effects could occur to streams and their associated riparian areas. A measure used to compare alternatives is the total number of temporary stream crossings, because this is a potential, short-term direct effect that varies by alternative. Alternative 2 would have 15 temporary stream crossings (including five that might be used during the non-winter season), and Alternative 3 would have 20 temporary stream crossings (including five that might be used during the non-winter season). As harvesting operations are concluded, temporary stream crossings would be removed and stabilized.

The following table summarizes potential sources of sediment that could affect water quality. Based on this table, Alternatives 3 may be expected to disturb more acres. Mitigations are expected to reduce any effects of this disturbance to the short term.

Table 6: Comparison of Water Quality Measures by Alternative

Activity	Alt 1	Alt 2	Alt 3
Number of Temporary Stream Crossings	0	15	22
Acres of Landings *	0 ac	5 ac	6 ac
Acres Disturbed by Skid Trails**	0 ac	25 ac	32 ac
Total Disturbed Acres	**0** ac	**30** ac	**38** ac
Total % of Project Area Disturbed	**0%**	**<1%**	**1%**

* Estimated Acres of landings = 1/4 acres/landing (S.Jones, 2003).

** Based on estimated length of skid trail (S.Wingate, 2003, Logging Plan, Project File).

The direct and indirect effects on water quality from the proposed action alternatives are anticipated to be short-term and minor. The existing roads, landings, and skid trails provide an example of what these facilities would be in several years after use, when all appropriate mitigations and standards and guidelines are followed. Skid trails and landings would be vegetated and stabilized.

3.1.2.4 Cumulative Effects on Water Resources

In general, as water flows downstream, pollutants are mobilized into the stream system, and any changes in the water resources related to a project merge with other waters within the larger watershed. The three subwatersheds in which the Nubble project is located flow into the larger Ammonoosuc watershed. However, the larger scale of this watershed would make it difficult to discern any cumulative effects related to the Nubble Project Area.

The cumulative effects discussion on water resources reference the subwatersheds of Haystack Brook (Hydrologic Unit Code (HUC) 01080101250080, 6,724 ac), Little River (HUC 01080101250070, 6,936 ac), and the Gale River (HUC 01080101230010, 13,210 ac). All of the units proposed for harvesting in the Nubble Project Area are within the boundaries of these subwatersheds, as described (Map 7). The cumulative effects time period is from 1993 (the time period after which an effect of previous harvesting might have an effect at present on the cumulative effects area) through 2016 (10 years after the effects of harvesting in the Nubble Project Area might have an effect). No additional activities are planned in the cumulative effects area through 2016 on federal land.

The Haystack/Little River subwatershed contains 11 miles of state and local paved roads, and 2.6 miles of unpaved Forest Development Roads. The Gale River subwatershed has 4.1 miles of state and local, paved roads, and 11 miles of unpaved Forest Development Roads. These unpaved roads were built or are managed according to the standards and guidelines of the 1986 Forest Plan, which were devised to minimize soil erosion. These practices have been used effectively since the early 1970s. Permanent soil compaction will exist on these road locations, as anticipated in the 1986 Forest Plan FEIS.

The following table displays the percent of land ownership within the subwatersheds.

Table 7: Subwatershed Ownership

Subwatershed	Ownership	
	Federal	Private
Haystack Brook	36%	64%
Little River	93%	7%
Gale River	98%	2%

The last timber sales in these subwatersheds began in the mid-1980s and were closed in the early 1990s.

The majority of the private land listed in the Haystack subwatershed is actually located on the north side of the Ammonoosuc River and outside of the Nubble Project Area. Ongoing and future soil-disturbing activities on private lands in the subwatersheds include roadwork (including road re-construction of Route 3 by the New Hampshire Department of Transportation – NHDOT), a minor amount of housing construction, and timber harvesting. It is not known what amounts of these activities would occur in the future, but the activities would be restricted to private land. However, all activities are required to follow State of New Hampshire Best Management Practices or regulations to protect soil and water resources.

The NHDOT Route 3 project is reshaping roadside shoulders. Use of BMPs is mandatory, including progressively stabilizing soils (mulching) and re-vegetating the areas as work progresses.

The activities on non-federal land are not expected to contribute to the potential cumulative effects from the Nubble Project. It is expected that all streams within the three subwatershed would maintain their Class A status.

To protect against potential cumulative effects on water resources generated by additional runoff from timber harvesting, the Forest Plan includes the following standard and guideline:

> Within a ten-year period on a 1,000-acre or larger watershed, no more than 25% of the total area (comparable to 25% of basal area) will be clearcut (Forest Plan Standard and Guideline, III-17).

In the past, a variety of silvicultural treatments have occurred on federal land in the Haystack Brook, Little River, and Gale River subwatersheds. Treatment types varied from clearcuts to thinning. In general, due to the limited nature of timber harvesting practices and the use of BMPs, effects from timber harvesting were limited to the short term and the project area where the activities took place. This standard and guideline has not been exceeded.

Alternative 1

No direct or indirect effects would result from Alternative 1. Therefore, there are would be no cumulative effects on water resources.

Alternatives 2 & 3

Effects of tree removal on water yield tend to be localized and are unlikely to extend beyond first order streams in well-managed forests, where relatively small portions of the watershed are being harvested at a given time. This is because such increases lose their identity as they join storm flow from the larger surrounding rivers (Neary and Hornbeck 1994).

Different silvicultural treatments reduces basal area by different amounts: clearcutting and patch clearcutting approximately 100%, thinning and single-tree selection approximately 33%, group selection approximately 16%, and a combination of single tree and group selection approximately 23 (S. Wingate, 2003).

Using these basal area reduction estimates for the proposed treatments in each alternative, the following table shows that all of the alternatives would result in an overall basal area reduction well below the 25% that would result in detectable water yield increases per local and relevant Hubbard Brook studies, and would be within Forest Plan Standards and Guidelines. Therefore, no measurable increases in water yield are expected to occur at this level, and, therefore, no associated cumulative effects would occur.

Table 8: Comparison of Alternatives - Average % Basal Area Removed from Each Subwatershed from 1993-2016*

Subwatershed	Alternative		
	1	2	3
Haystack Brook	1%	4%	4%
Little River	2%	3%	4%
Gale River	3%	4%	5%

* See Appendix C for a list of past activities in the area and individual calculations are in the project file.

In summary, there is a low risk of cumulative effects on water quality, water quantity, or on water resources within the Haystack Brook, Little River and Gale River subwatersheds as a result of either action alternative, particularly because the alternatives propose activities that would result in short term disturbance on a relatively small portion of the watershed, most of which would be mitigated using BMPs and standards and guidelines from the 1986 LRMP.

3.1.3 AIR QUALITY

3.1.3.1 Air Quality Affected Environment

See Appendix E, §**B.2.2.3**, for additional information on the airshed characteristics of the White Mountain National Forest.

The Nubble Project Area, located in the White Mountains airshed, is about 10.5 miles from the Presidential Range-Dry River Wilderness and 12 miles from the Great Gulf Wilderness Area - mandatory Class I areas on the White Mountain National Forest. The project area is located on the north slopes of the predominately east west trending valley of Ammonoosuc River. Winds in the area are dominated by mountain valley dynamics interacting with large-scale atmospheric movements. (USDA, 2002).

Air pollution that originates in the project area is mostly related regional sources as well as local sources of dust from roads and vehicle emissions. Wood burning contributes particulates and carbon monoxide to the air. Dust from roads contributes particulates. Vehicle emissions are associated with hydrocarbons, carbon monoxide, nitrogen dioxide, and lead. None of these sources is expected to exceed New Hampshire or federal ambient air quality standards except for short time periods from wood stoves, wildland fires, and prescribed fires. Wildland and prescribed fire do not occur in the area at a large scale.

The project area is not located in a non-attainment area for any of the National Ambient Air Quality Standards (NAAQSs). The closest non-attainment area is for ozone and is located in the southern counties of New Hampshire, Merrimack, Cheshire, Hillsborough, Rockingham, and Strafford Counties. It can be seen from the occurrence maps, that ozone appears to originate around large urban centers and migrates northward to the White Mountain region during times of high temperature and air stagnation. The project area is about 71 miles from the closet point of Merrimack County.

3.1.3.2 Air Quality - Related Mitigation Measures

There are no mitigation measures for air quality. This is because effects related to air quality related to the action alternatives are expected to be very short term. Although not a specific mitigation for air quality, winter operations would reduce dust from road use by logging traffic.

3.1.3.3 Direct and Indirect Effects on Air Quality

The primary source of any concern for air quality within the project area is the use of heavy equipment and gas-operated tools during timber harvest and road maintenance operations. Emissions from motor vehicles, heavy equipment and gas-operated chainsaws could directly affect air quality in the project area. The most significant emissions from diesel motors used to operate heavy equipment and some motor vehicles are nitrogen oxides ($NO_{x)}$ and particulate matter, both of which contribute to public health problems in the United States. NO_x emissions from diesel vehicles play a major role in ground-level ozone formation that is most problematic in the summer months.

Alternative 1- No Action

No activities are proposed; and no additional emissions are expected to take place within the project area, beyond what occurs now. Forest Service classified roads will continue to receive their scheduled level of maintenance, and the Nubble Road will continue to be used for dispersed recreation on a fee basis in the summer and fall, and as a snowmobile trail in the winter. Visitors camping at designated sites within the project area will continue to use campfires. These existing emissions are currently contributing to the air quality condition described in the affected environment as well as the larger scale air quality issues discussed in the cumulative effects section of this report.

Alternatives 2 & 3

The direct effect of timber harvest and road maintenance activities proposed in these action alternatives is the emission of NO_x and particulate matter resulting from the use of heavy equipment, diesel-operated motors, and gas-operated chainsaws and other tools. However, because of the limited duration of operation of this emission-generating equipment, and because this equipment will generally be operated in the winter months, with some exceptions, it is unlikely that the proposed operations would exceed the NAAQS. Since ground level ozone is worst during summer months, winter harvest would minimize this effect so that ozone is unlikely to form at elevated levels as a result of the proposed activities. For units harvested outside of winter, effects would depend on levels of emissions from the vehicles and the weather conditions, including amount of sunlight and temperature. These emissions may contribute to ground level ozone in the project area, but they would be short in duration and limited to the areas of operation on any given day.

3.1.4.4 Cumulative Effects on Air Quality

For a general discussion of the cumulative effects of air quality on the White Mountain National Forest, see Appendix C, §**B.2.2.3**

The cumulative effects area for air quality is the Haystack Brook, Little River and the North Branch of the Gale River subwatersheds, as previously described, because the potential effects to air quality generated by any of the proposed activities are likely limited to those areas of operation within the project area, and they are not expected to extend any further. No additional projects are expected to take place on federal land in the next decade.

Alternative 1 - No Action

No local emissions related to the proposed action would occur. The existing condition and trends as described in the affected environment would remain much the same. The same activities that currently are occurring in the cumulative effects area would continue to occur. Future vehicle emissions are likely to increase as more visitors come to the White Mountain National Forest. This could contribute to ground level ozone levels when conditions are suitable. New large sources in the cumulative effects area are unlikely since most of the cumulative effects area on the forest and remaining portion on private is largely undeveloped. Cumulative effects, as described in Appendix H, §**B.2.3.1** would continue to occur with the same trends.

Alternatives 2 & 3

All alternatives would result in the same activities that produce emissions, the use of heavy equipment and trucks. None of these emissions is

expected to contribute to existing cumulative effects already present in the cumulative effects area. This conclusion is reached, because, as discussed in **Air Quality Direct and Indirect Effects**, above, the emissions related to the action alternatives are expected to be local to the project area and of limited extent. These limitations are due to the timing for most of the harvesting (winter season) and the limited duration of these emissions.

3.1.4 TRANSPORTATION FACILITIES

3.1.4.1 Transportation Facilities Affected Environment

The Nubble Project Area contains 7.0 miles of National Forest "Forest Development Roads". The project area is approximately 6 square miles (3,900 acres), so the density of Forest Development Roads is 1.2 miles per square mile of National Forest land. The table below, displays the inventory numbers, names and lengths for the Forest Service classified roads within the Nubble Project Area. These Forest Development Roads fall into three general categories: 1) roads seasonally open to the public, 2) roads that are open to the public on a limited basis, and 3) roads that are not open to the public. All of these roads are in place and are suitable and adequate for the logging systems used on this National Forest.

In some cases, roads in categories 2 and 3 have had drainage structures removed and waterbars installed since their last use, and they will need to be "restored" to their original operating condition. This may involve clearing brush that has grown in the roadway over the years, cleaning or reestablishing ditches, and spot surfacing or grading, as well as replacing the drainage structures and removing the waterbars.

A fourth road category is temporary roads used to access landings. These cannot be planned as the need is dependent on the timber purchasers equipment and logging strategy. These are anticipated where skidding distances are long and the purchaser may wish to invest in a temporary road, use a forwarder, or use a long skid with conventional equipment. These are also used where there is a short distance between an existing system road and the best suited landing site. In that case the access road is actually part of the landing development. These temporary road segments may be newly constructed or they may be reconstruction utilizing an old skid trails. In either case, temporary roads are intended to supplement the classified road network by providing one-time access to a specific project. The effects of a temporary road are similar to a main skid trail. Once the project is completed, the road is no longer needed, and it is obliterated or closed and allowed to re-vegetate.

In 2000 the Forest Service issued new rules for managing the transportation facilities of the National Forest System. These rules define roads as classified (needed for long term use), unclassified (existing roads for which a determination of long term need has not yet been made), and temporary (roads not necessary for long term use). The process of developing an inventory and atlas of all roads within the White Mountain National Forest, and a Forest-wide roads analysis that will initiate the process for determining the long term need for each road on the Forest are both ongoing, and are intended to inform any changes in the management of the Forest road network that may result from the revision of the 1986 LRMP that is currently underway. For this environmental assessment, road definitions and management direction is that which is provided by the 1986 LRMP.

The 1986 LRMP defines Forest Development Roads as "those roads needed for White Mountain National Forest purposes" and describes three standards for these roads: Type I (intermittent, winter service), Type II (intermittent, seasonal service), and Type III (three season, constant service).

Within the Nubble Project Area, two roads meet the Type III standard – Haystack Road (FDR 304) and the Gale River Rd North Road (FDR 25). The remaining roads are either Type I or Type II. See Table 9 for a list of the roads found within the Nubble Project area.

The Haystack Road, Forest Development Road, FDR 304, and Gale River Rd. North are the only Type III roads that fall into the first category of "roads seasonally open to the public". FDR 304

is closed in the late fall when the surface becomes slick due to ice and snow. The section of the road that traverses the project area is crossed by a snowmobile trail in the winter. This road is in excellent condition

Table 9: National Forest System Roads (NFSR) within the Nubble Project Area (Map 1)

FS Road	Road Name	Total Length Within Project Area
NFSR 135	Beaver B. Picnic A.	0.06 Miles
NFSR 25 [a, f]	Gale River R. North	2.60 Miles
NFSR 25A [b]	Gale R R N Spur A	0.10Miles
NFSR 25B [b]	Gale R R N Spur B	0.13Miles
NFSR 304 [a, f]	Haystack Rd	2.10Miles
NFSR 304A [b, e]	Haystack R Spur A	1.90Miles
NFSR 92 [a]	South Gale Rd	0.14Miles
US 3	Route 3	3.00Miles
	Total	**10.03Miles**

[a] The road is gated shut when ice and snow accumulate making travel unsafe in the fall. Portions are open to snowmobile traffic during the winter. Open to vehicle travel in the late spring, and usually before Memorial Day weekend.

[b] Gated shut year around

[c] Road gated. Used for intermittent hauling.

[d] Gated shut year around Winter hauling only

[e] Berm. Winter hauling only.

[f] Road leads to a trailhead parking.

Gale River Rd. North, Road FDR 25, is a Type III road that falls into the second category of "roads that are open to the public on a limited basis". These two roads provide access to a large portion of the project area. They are surfaced with aggregate, and are gated shut for much of the year. They have a number of the dispersed, primitive campsites located along their respective lengths, but vehicle access to these sites is typically limited to overflow periods, usually high use weekends and holidays. If these roads are used for access during timber harvesting, the purchaser would be responsible for maintenance.

The remaining Forest Development Roads within the project area are either short spurs, a spur accessing a trail head, a short portion of a road servicing a different area or Type I or Type II Roads that fit the third category of "roads that are not open to the public" for motorized access. FDR304A may have either bank run or aggregate surfacing over short stretches, but it generally has a native soil surface. It is Type II for .8 miles and accessible from a gate. The remaining distance is 1.1 miles and Type I. It is closed by earthen barrier and the drainage structures are removed and water bars installed, and had received little if any use since it was closed to the public. This road would need to be restored to the original operating condition before it can be used for vehicle access again.

In addition to the Forest Development Roads, there is a more extensive network of travelways within the project area. This includes old logging roads and skid trails, a number of which may predate the National Forest, and most of which might be called "unclassified roads" under the 2000 transportation rules. There are also hiking trails, including Beaver Brook, Gale River and North Twin Trail as well as a snowmobile trail.

3.1.4.2 Transportation Facilities - Related Mitigation Measures

In addition to the generally applicable Forest-wide and Management Area Standards and Guidelines listed in the Forest Plan (§III and Appendix VIIB, pp. 18-22), the following specific mitigation or coordination measures would be used to implement timber harvest operations within the project area, unless listed as optional:

- For public safety, close or reroute snowmobile Trails during winter weekdays, if operations create a potential hazard to trail users. Signs warning of harvesting and trucking activities would be posted and maintained at all major entry points. Require in sale contract.
- The Gale River North Road would be closed to snowmobiles during sale operations. Signs would be posted at all snowmobile, entry points to the Road. These would be required in sale contract. Coordination with snowmobile clubs will occur prior to sale activity.
- Slash disposal zones and treatment would be as follows:
- Along the edge of the Haystack (NFSR 304) and Gale River North Road(NFSR 25) and the Beaver Brook Trail, all slash from purchasers operations will be removed a

distance of 50' and lopped to within 3' of the ground for another 50'.

- Roads will be closed from March 30–May 20 to reduce deterioration of roads during spring when frost leaves the thaws an soils are saturated.
- The exact location of log landings, main skid trails and stream crossings would be agreed upon in advance with the sale administrator and District staff. The size or location of log landing locations will not be altered without the approval of the sale administrator.
- Upon completion of harvesting operations, any temporary roads constructed to facilitate access will be closed and obliterated.

3.1.4.3 Direct and Indirect Effects on Transportation Facilities

No road construction is planned for any alternatives. The existing road density of 1.2 miles of road per square mile would not change.

A number of steps would need to be taken to facilitate a timber harvest operation using the Forest Development Roads and other travelways within the project area. As much as 7.3 miles of Forest Development Roads (including some segments of the Haystack and Gale River North Roads) would need to be restored to the "standard to which they were originally constructed".

A system of skid trails and landings would need to be identified and utilized to access individual stands and move trees to central loading sites. For the most part, this system would utilize the existing network of old logging roads, skid trails and landing sites. Although harvesting operations could need as much as 22 miles of skid trails and 21 landings, few new skid trails would need to be cleared, and a maximum of 4 new landings would need to be constructed (landings are generally ¼ to ½-acre in size) to service all of the potential harvest units identified in the project area. Most of the landings are located adjacent to Forest Development Roads; but, in the case of some of the new landings, the best site may be in a location that requires construction of a temporary road to gain access. In these situations, the Timber Sale Contract authorizes the purchaser to construct temporary facilities if agreed to by a Forest Representative. Approval is based on the Purchasers need and protection of Forest values. The purchaser's equipment and operating methods may or may not result in a request to build temporary roads and landings. For the Nubble Project Area, it is anticipated that a purchaser may request as much as 0.9 miles of temporary roads to facilitate access to landing sites. Temporary roads will be obliterated upon completion of timber harvest operations.

Alternative 1 - No Action

Harvesting is deferred on National Forest lands suitable for timber harvest (as described in the LRMP) within the project area until some later time. Current road use will continue (see Table 32, above). Regular planned road maintenance will occur on the FR 25 and 304. Activities may include: smoothing, removing debris, cleaning ditches, posting signs and replacing culverts. With no activities taking place, there will be no direct effects.

Alternatives 2 & 3

The following table displays the roads that would be used to implement Alternatives 2 & 3 and the miles of the roads that would be used. See Table 10, above, for the status of the roads that will not change with implementation of Alternatives 2 & 3.

Table 10: Forest Service Roads and Miles Necessary to Implement Alternatives 2&3

FS Road	Total length	Alt 2	Alt 3
NFSR 135	0.06 Miles	0	0
NFSR 25	2.40 Miles	2.4	2.4
NFSR 25A	0.10 Miles	0	0
NFSR 25B	0.13 Miles	0	0
NFSR 304	2.56 Miles	2.3	2.3
NFSR 304A	2.30 Miles	0.8	2.3
Total	**7.69 Miles**	**5.5**	**7.0**

Implementation of timber harvesting in Alternatives 2 & 3 would require approximately 19 and 21 landings respectively. Seventeen (17) of the landings are already in place. Some trees and saplings would need to be cleared before the existing landings can be used. The remaining four (3 and 4) landings would need to be constructed. Landing location and use are agreed to between the purchaser and the Forest Service prior to implementation.

A ground-based logging system would be used for harvesting timber. Trees would be felled either mechanically or by chainsaw. All products would be moved to the landings using rubber-tired skidders. Forest Service personnel must approve in advance the primary skid trail locations, including any stream crossings and the method used to cross the streams.

Skid trails would utilize existing corridors wherever possible, typically old temporary roads and skid trails. In those situations where new corridors would be needed to skid wood, they would be constructed in accordance with the standards and guidelines established in the 1986 LRMP. Consideration was given to reconstructing some of the old temporary roads to facilitate truck traffic; however, this was not necessary to provide access to landing sites and maintain adequate operational efficiency for the proposed timber harvest.

To implement Alternatives 2 & 3, road restoration will be required for between 5.5 and 7.0 miles of existing Forest Service roads. As defined by the 1986 LRMP, restoration is the rebuilding of an existing road to its original standard. In this case, it would generally require removing or opening closure devices and replacing water bars with culverts or other drainage structures. It would also mean removing brush from the travelway and ditches, cleaning and reestablishing ditch lines and drainage patterns, curve widening where necessary, placing spot surfacing, and grading.

During winter harvesting operations, the Gale River Rd. North would be managed to accommodate timber harvesting and snowmobile traffic will be detoured to an alternate location. If eligible units are harvested during the summer, the Haystack Road would be managed to accommodate both timber harvesting and the dispersed recreation use in a safe manner. See §§**3.1.1, 3.1.2, 3.2.2**, and **3.3.2** for the indirect affects that roads, landings, and skid trails may have on these resources.

3.1.5.4 Cumulative Effects on Transportation Facilities

The cumulative effects area for transportation facilities is the Nubble Project Area. No road construction is planned in the project area under either action alternative. Therefore, the transportation facilities already in place in the project area would not change as a result of the Nubble action alternatives. No additional activities are anticipated within the next decade (2012) in the Nubble Project Area. Therefore, there are no cumulative effects expected to the transportation facilities as a result of activities proposed under the Nubble Project.

3.2 Biological Environment

3.2.1 VEGETATION

3.2.1.1 Vegetation Affected Environment

Woody Vegetation

Major forest community types on the White Mountain National Forest and their silvicultural guides are referenced in Appendix C1 of the Forest Plan. The northern hardwood guide referenced in the Forest Plan is replaced by "A Silvicultural Guide for Northern Hardwood Types in the Northeast", Northeast Forest Experiment Station Publication NE-603, 1987. The northern hardwood type consists of three subtypes: beech-birch-maple, beech-red maple, and mixedwood (hardwoods mixed with softwoods).

For a vegetative history of the project area, see Appendix C.

Within the project area, there is a predominance of northern hardwood forest (68%). The aspen-birch, spruce-fir, and hemlock forest communities do not meet Forest Plan desired conditions for HMUs 110 and 111 (Appendix E). Although the species content of these stands may change due to the proposed activities, it unlikely that there would be an increase to some of these community types.

Species content, site factors, and other resource values have been analyzed for each stand to determine if even-aged or uneven-aged management is the most desirable type of silvicultural management. The results propose even-aged management on 45% of the project area and uneven-aged management on the remainder.

For the stands being analyzed in the action alternatives, northern hardwoods predominate. All of the stands have reached a point where a treatment is recommended based upon the current stand condition, management objectives, Forest Plan standards and guidelines, and the respective Silvicultural Guides. The silvicultural prescriptions contained in the project file describe this in more detail. All of the stands being considered for even-aged regeneration are mature. One of these stands is primarily stocked with poorly formed trees. This stand is classified as low quality, meaning it does not have an adequate stocking of healthy trees or quality stems to fully utilize the site.

Federally Listed and Eastern Region 9-Listed Sensitive Species

The Forest Service interdisciplinary team conducted site-specific field reviews of the proposed project area at various times of the year including periods of flowering and leaf off. District Biologist Weloth observed common herbaceous plant species typically found in the northern hardwood forests of the White Mountain National Forest.

Forest Service site-specific botanical surveys

found no occurrences of federal or state listed or other plants of concern on the WMNF within portions of the hardwood, softwood, and riparian habitat of the project area (see the Nubble project file). Furthermore, the Forest Service checked the NHNHI database of rare plant occurrences throughout the state and there are no known documented occurrences of federal or state-listed plants within the Nubble Project Area (NHNHI-Cairns 2003). A site-specific survey (NHNHI-Sperduto 1993) documented the occurrence of a small population of the state-listed, threatened bilberry (*Vaccinium uligionosum* var *alpinum*) located on the rocky outcrop of the Nubble summit, which is located outside the project area in MA 6.2 land. The USFWS's pogonia habitat model did not generate a map showing potential suitable habitat for the federally-listed threatened small whorled pogonia *(Isotria medeoloides)* within the Project Area.

This section summarizes the probability of occurrence determinations for federally threatened, endangered, proposed and Forest Service Eastern Region 9-listed sensitive species (TEPS) of plants for the Nubble Project Area. These plants were addressed in detail in the Nubble BE/BA (located in the project file). Several of the plants that are federal or state-listed are associated with alpine and sub alpine habitat, and these habitats do not occur within the Nubble Project Area (Sperduto and Cogbill 1999, NHNHI-Sperduto 1993). Therefore, there is no probability of alpine plants occurring in the Nubble Project Area.

The Nubble Project Area does not contain suitable alpine bog/meadow/ravine habitats for the recently federally de-listed endangered Robbins' cinquefoil *(Potentilla robbinsiana)*.

Based on suitable habitat present within the hardwood and spruce/fir community types within the project area, the Nubble BE/BA (in project file) disclosed there is a very low probability of occurrence of the R9SS listed plant species in the Nubble Project Area shown in the following table.

Table 11 - TEPS Plants with Probability of Occurrence Within The Nubble Project Area.

Federal Status	TEPS SPECIES		Probability Of Occurrence/Habitat type
R9-Sensitive	Bailey's sedge	*(Carex baileyi)*	Very low potential = forested wetlands
R9-Sensitive	Clustered sedge	*(Carex cumulata)*	Very low potential = open woods
R9-Sensitive	Squirrel-corn	*(Dicentra canadensis)*	Very low potential = moist woods
R9-Sensitive	Goldie's woodfern	*(Dryopteris goldiana)*	Very low potential = rich mesic forest
R9-Sensitive	Broad-leaved twayblade	*(Listera convallarioides)*	Very low potential = wet shady woods
R9-Sensitive	Chilean sweet cicely	*(Osmorhiza berteroi)*	Very low potential = deciduous forest
R9-Sensitive	American ginseng	*(Panax quinquefolius)*	Very low potential = semi-mesic forest
R9-Sensitive	Nodding pogonia	*(Triphora trianthophora)*	Very low potential = beech hardwoods

State Listed and Other Species of Concern on the WMNF

This section addresses the probability of occurrence of State-listed threatened, endangered, special concern (TESSC) and other species of concern on the WMNF (Vegetation Report in the Project File). The Forest Service checked the NHNHI database of rare plant occurrences and there are no known documented occurrences of state-listed or other plants of concern within the Nubble Project Area (NHNHI-Cairns 2003, NHNHI-Sperduto 1993).

The Project Area contains northern hardwood, paper birch, spruce/fir, and mixed hardwood/softwood forest types. These habitats could provide potential suitable habitat for some state-listed TESSC and other species of concern on the WMNF. If suitable habitat was present within the proposed Project Area for species **documented or suspected** as occurring on the WMNF, subsequent analysis of potential effects was based on the **assumption that the suitable habitat present could be occupied by these State TESSC or other species of concern**.

Table 12 and the Vegetation Report in project file discloses the State-listed and other plants

of concern that have a **very low** probability of occurrence within the Project Area. Because all of the state-listed endangered species had federal status as well, they were addressed in the Nubble BE/BA (in the Project File).

Table 12: State TESSC Plants Having A Very Low Probability Of Occurrence in Nubble Project Area.

Ciliated aster	Pale early violet	Large purple-fringed orchid	Millet-grass	Alpine speedwell
Bosc's pigweed	Kidney-leaved violet	Meadow horsetail	Rock sandwort	Purple crowberry
Squaw-root	Large yellow lady's-slipper	Walking-fern spleenwort	Flowering dogwood	
Canadian germander	Small yellow lady's-slipper	Large-spored quillwort	Jack pine	
Hound's tongue	Pink lady's slipper	Green adder's-mouth	Hidden sedge	
Dutchman's breeches	White-fringed orchid	Trailing arbutus	Many leaved bulrush	

3.2.1.2 Vegetation - Related Mitigation Measures

- Indigenous, minority tree species or beech trees genetically resistant to scale complex would be encouraged in uneven-aged treatments by cutting trees around them that compete for space and resources. In even-aged regeneration treatments, these species would be protected and buffered with a group of other leave trees.
- In clearcuts, a mix of residual trees would be left to improve wildlife habitat, modify the visual appearance of the stand and add diversity to the composition of the future stand. In clearcuts or group selection treatments, where residual understory plants interfere with the germination and development of desirable tree seedlings, a mechanical site preparation treatment would be used to control low shade. If seedlings develop, but are controlled by residual vegetation, a release treatment would be applied by removing some of the interfering woody vegetation.
- If listed plants are found during project implementation, the sale administrator would alert the district biologist, and protective measures would be taken.
- Winter harvest when and where feasible.
- Use designated skid trails and landings.
- Use native vegetation and straw (when available) during revegetation practices per Executive Order 13112, 23/99.

3.2.1.3 Direct and Indirect Effects on Vegetation

The general effects of timber harvesting activities on vegetative diversity can be found in the Forest Plan FEIS, pp. IV-32 and IV-33. For a discussion of general effects of timber harvesting on vegetation see Appendix C, §**B.2.3.1.2.**

Alternative 1 – No Action

Under no action, all stands in the project area would continue to grow and mature. Some trees would die from natural forces related to size, competition, or age stress. These trees would be replaced by other similar or more shade-tolerant individuals. Over time, the stand would begin to resemble a climax vegetation type. This means a species shift from stands that may contain paper birch, red maple, white pine, ash, aspen, and/or oak to stands dominated by beech, sugar maple, yellow birch, and hemlock. Natural disturbances could modify this outcome by temporarily encouraging the less shade tolerate species.

Course woody material would be recruited on the forest floor as trees die. Remaining, healthy trees would grow larger. Larger trees would become more susceptible to ice damage, wind throw, and natural or exotic forest pests. Susceptibility to natural forces over time results in natural disturbances. These may occur in small pockets or over larger areas.

The No Action alternative would have no direct effect such as trampling or compaction on the herbaceous species that currently occupy the sites.

Table 12 displays the differing silvicultural treatments for Alternatives 2 and 3.

Alternative 2 – Proposed Action

Mature stands planned for regeneration cuts (clearcutting, 114 ac) would be replaced by young growth. Species content in these stands would to shift more towards shade intolerants such as aspen, paper birch, and white ash. The disturbance may encourage regeneration from, yellow birch, or hemlock. A few species of woody or herbaceous vegetation, who's seeds have a long period of dormancy, such as raspberry and pin cherry, would have an opportunity to germinate and become part of the ecosystem for a period of time. This would increase species diversity.

Stands planned for group selection (124 treatment acres ac) would have regeneration cuts that are small in size, 1/10 to 2 acres, and are located throughout the stand. These groups would regenerate, on average, 16% of the stand area. Group selection would continue to be practiced in these stands in future management entries. Regeneration would tend toward a broader mix of shade-intolerant, intermediate, and shade-tolerant species. Nearly all the species currently represented in the stored seed mix, or those originating from nearby seed trees, would have an opportunity to germinate and grow in these varied light conditions. There would be some variation in species mix from year to year due to seed periodicity and dispersal. The amount of ground disturbance can affect species content. Disturbance would favor the establishment of raspberry, paper birch, and yellow birch.

In stands being treated using single-tree selection, a portion of the stand stocking would be cut and removed to stimulate regeneration and to harvest defective or declining and mature trees. Less than 1/3 of the stocking would be removed to create space and light for seeds to germinate and for young trees to grow. Generally, the larger trees would be cut leaving a stand of smaller trees with a dense understory of tree regeneration and other woody plants. Over time residual tree growth and in growth fills in and returns the stand to full stocking. The residual stand restricts sunlight so that the treatment would favor shade-tolerant plants. Over time, there would be a shift in species toward beech, sugar maple, and hemlock. Eventually other species would be eliminated from the population. Single-tree selection allows managers to improve the quality of shade-tolerant growing stock. Beech trees that are genetically susceptible to beech scale disease or sugar maple trees affected by the sugar maple borer can be cut and removed from the stocking.

All of the plant species known to occur within the project area are common to northern hardwood communities. Vegetation management would affect herbaceous plant species currently occupying proposed harvest units. Herbaceous plants in adjacent uncut stands would also be affected up to approximately 100 feet from the edge of the units proposed for clearcutting. The effects include changes in environmental gradients (i.e. heat, sunlight reaching the ground floor and moisture, and less competition from intolerant species) created by clearcutting, increased competition from intolerant species, or direct disturbance from harvesting activities. Negative effects tend to be greatest on plant species that are dispersed by animals and least on wind dispersed species. A few species of woody or herbaceous vegetation who's seeds have a long period of dormancy, such as raspberry and pin cherry, would have an opportunity to germinate and become part of the ecosystem for a period of time. These would increase species diversity. These effects are likely to last for 50 years for some species. Within 30-50 years, the understory environment would return to pre-harvest conditions.

Uneven-aged management has less impact on herbaceous plant species than even-aged management. Single-tree and group selection harvesting result in fewer changes in environmental gradients. Direct disturbance from harvesting activities would remain about the same as with clearcutting. Many species of woody shrubs and herbaceous vegetation could also become established. The amount of ground disturbance can affect species content. Disturbance would favor the establishment of

raspberry, paper birch, and yellow birch.

Table 13: Comparison of Silvicultural Treatments by Alternative

Activity	Alternative 1		Alternative 2	
	Stand Acres	Treatment Acres	Stand Acres	Treatment Acres
Even-Aged Management				
Clearcutting	132	114	435	305
Patch Clearcutting	0	0	136	24 (18%)
Thinning	66	66	166	166
Uneven-Aged Management				
Single-Tree Selection	252	245	242	237
Group Selection	621	101 (16%)	502	78 (15%)
Group/Single-Tree selection	194	Groups 23 (12%) Single-Tree 171	168	Groups 20 (12%) Single-Tree 148

Alternative 3

Alternative 3 proposes most of the activities from Alternative 2 and additional treatments when combined with the activities proposed in Alternative 2, more aggressively meet overall Forest Plan desired conditions and objectives for habitat management units 110 and 111. This is accomplished by prescribing additional even-aged regeneration treatments where stand conditions permit. These additional treatments often compromise other resource values.

For example some mature stands, that are suitable for regeneration, are located in areas of high visual sensitivity. In this case various modification in clearcut size, shape, or position can mitigate the effect. Another option is to use patch clearcutting.

Patch clearcutting is a compromise between clearcutting and group selection. The treated areas are smaller, 2-9 acres, than a normal clearcut, but large enough to produce primarily shade-intolerant vegetation. The effects of patch cutting are similar to clearcutting in the resultant vegetation change but are visually less pronounced as is group selection.

In Alternative 2, 86 acres that are mature and qualify for a regeneration harvest are treated with group and or single-tree selection. As part of those treatments pockets or individual trees that are low quality or short-lived species could be harvested now. Quality saw timber trees that are not yet financially mature, could be retained. This financially immature portion represents the majority of the stand, while the portion regenerated in groups is the minority. In Alternative 3 the entire stand would be harvested now in the interest of obtaining more young growth habitat. This rational applies to compartment 19, stands 18 & 50, compartment 20, stands 35 & 49. In addition stand 52 of compartment 20 was not prescribed in Alternative 2 but is biologically mature. It has excellent quality saw timber that is not yet financially mature.

Stand 19 of compartment 20 was thinned in a previous entry. The disturbance resulted in some high quality and very desirable, shade-tolerant regeneration. The stand is mature and qualifies for regeneration. A clear cut now as proposed in Alternative 3 would injure the regeneration. The current stand structure provides an opportunity to convert to an uneven-aged strategy. Because the stand is adjacent to the cross-country ski trail, an uneven-aged approach would be more visually compatible.

Stand 77 of compartment 19 is dominated by low-quality stems and was substantially affected by a blowdown event. It qualifies for an even-aged regeneration treatment and is included in Alternative 3. There is currently a lot of softwood regenerating in the understory due to the blowdown stimulus. It would be desirable to convert this stand to one with a greater representation in softwoods. Deferring treatment now could facilitate that. Also, this is a marginally economic opportunity.

3.2.1.4 Cumulative Effects on Vegetation

The Management Area 2.1 and 3.1 Lands in Habitat Management Units 110 and 111 Cumulative Effects Area (Map 6, Appendix E) is used for vegetative cumulative effects analysis through the end of the decade 2012). These are the lands that are allocated to vegetative management in the Forest Plan. Other than the possible activities proposed in the Nubble Project, no other vegetation treatments are anticipated in the cumulative effects area through the end of the decade (2012)

The Forest Plan provides goals, objectives, and desired conditions for habitat communities and age classes on MA 2.1 and 3.1 lands within an "ideal" habitat management unit (Forest Plan, pp. III-11 through III- 14, VII-B-3 through VII-B-9; this EA, Appendix E). These habitat communities and age classes are determined by the vegetative composition of a stand of trees over time.

There are approximately 9,000 acres, within the MA/HMU cumulative effects area. Of that approximately 45% is managed using even-aged management. The age-class distribution is displayed below. There is a lack of regenerating age class in 2.1 and 3.1 lands across the HMU. Clearcutting provides a means of increasing this age class. The following figures display the Forest Plan desired "ideal", existing, and foreseeable (Alternatives 1-3) age-class distribution for northern hardwood, paper birch, and balsam fir/paper birch/aspen.

Figure 3: HMUs 110 & 111, MAs 2.1 & 3.1 Even-Aged Habitat Community Distribution

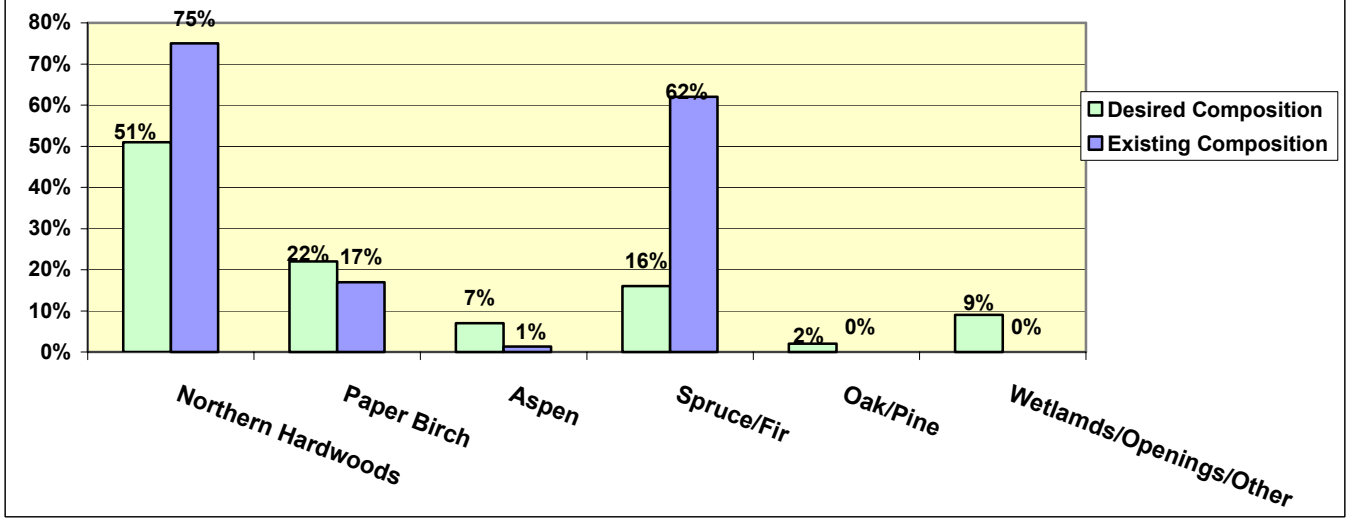


Figure 4: Comparison of Northern Hardwood EAM Desired, Existing, & Forseeable (2012) Age-Class Distribution HMUs 110 & 111, MAs 2.1 & 3.1

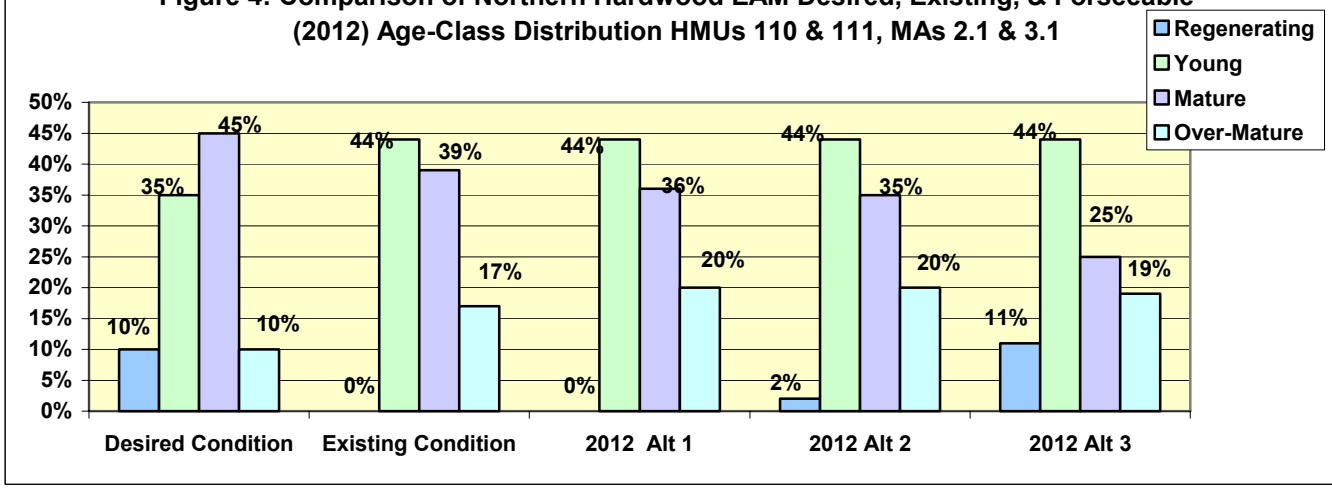


Figure 5: Comparison of Paper Birch EAM Desired, Existing, & Forseeable (2012) Age-Class Distribution HMUs 110 & 111, MAs 2.1 & 3.1

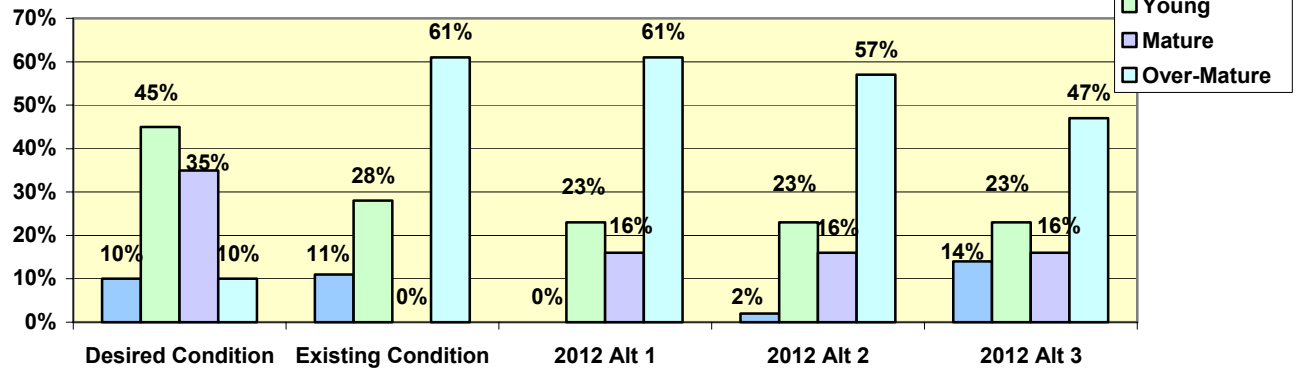
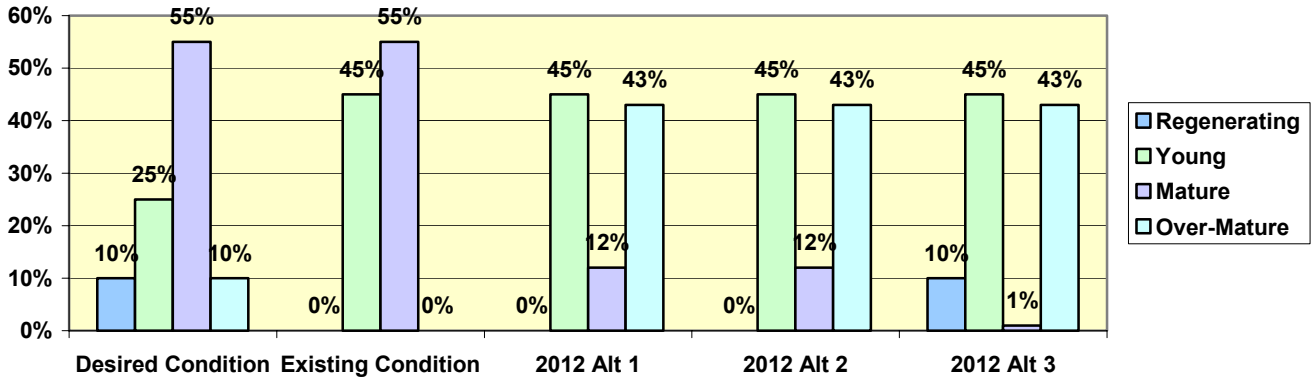


Figure 6: Comparison of Balsam Fir/Paper Birch/Aspen EAM Desired, Existing, & Forseeable (2012) Age-Class Distribution HMUs 110 & 111, MAs 2.1 & 3.1



Alternative 1

The effects would be the same as those discussed under direct/indirect effects, but across the cumulative effects area as a whole. In-growth over the coming decade will result in no regenerating age class in the cumulative effects area (currently the only regenerating age class in the cumulative effects area is in paper birch). See figures 3, 4, and 5 for the changes in mature and over-mature northern hardwood, paper birch, and balsam fir/paper birch/aspen in the foreseeable future.

Alternatives 2 & 3

For a discussion of general cumulative effects of timber harvesting on vegetation see Appendix C, **B.2.3.1**.

Both Alternatives 2 and 3 create regenerating age class in the northern hardwood, paper birch, and balsam fir/paper birch/aspen types. Alternative 3 creates 9% more northern hardwood, 12% more paper birch, and 10% more balsam fir/paper birch/aspen regenerating age class than Alternative 2. Alternative 3 meets the desired condition for balsam fir/paper birch/aspen but actually exceeds the desired condition for northern hardwood by 1% and paper birch by 4%.

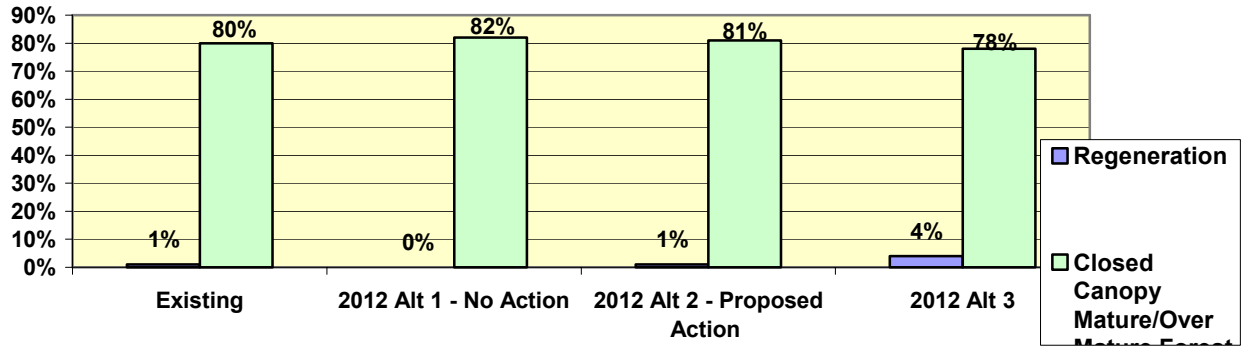
The increase in the regenerating age class also results in a decrease in the mature and/or over mature age classes, depending on what stands are harvested. Because the northern hardwood stands available primarily for regeneration are in the mature age class, there is an overall decrease in the mature age class in both action alternatives. Alternative 3 has a 10% greater reduction in the mature northern hardwood age class than Alternative 2, a 10% greater reduction in the over-mature paper birch age class, and an overall 10 % reduction in the mature balsam fir/paper birch/aspen age class.

A substantial portion of the Nubble Project Area has not received any management in the past, and no management is proposed for the foreseeable future. These areas would continue to produce herbaceous vegetation in natural cycles.

Forty-five percent (45%) of the cumulative effects area is managed using even-aged management. Fifty-five percent (55%) is under uneven-aged management.

Overall, the lands in uneven-aged management and the mature and over-mature age classes on the lands in even-aged management provide a closed-canopy (mature/over-mature) forest. Currently closed-canopy forest exists on 80% of the MA/HMU cumulative effects area. Growth through the end of the decade would reduce the regenerating age class to 0% and increase closed canopy forest to 82% Regeneration treatments in Alternatives 2 and 3 would have the effect of reducing the closed-canopy forest in the cumulative effects area. No additional regeneration treatments are anticipated in the cumulative effects area beyond what is proposed in the Nubble project. If no natural disturbances create regeneration, the maximum that closed-canopy forest could be reduced by is 4% under Alternative 2. Figure 6 displays the available regenerating age class and closed-canopy forest under existing conditions on management area 2.1 and 3.1 lands in HMUs 110 and 111 compared to the closed-canopy forest available by alternative in the year 2012.

Figure 7: Existing Regenerating and Closed Canopy Forest Compared to the Forseeable Conditions Resulting From Alternatives 1-3HMUs 110 & 111, 2.1 & 3.1 Lands



3.2.1.5 Direct & Indirect Effects to Federal & State Listed & Other Plants of Concern:

Tables 11 and 12 summarize the effects determinations rendered in the Nubble BE/BA (in the project file) for Federally-listed TEPS plant species. See the Vegetation Report for a detailed analysis of potential effects to State-listed and other plants of concern.

The general effects of timber harvesting activities on vegetative diversity can be found in the Forest Plan FEIS, pp. IV-32 and IV-33.

Alternative 1 – No Action

Understory shrubs and herbaceous vegetation would continue to grow, mature, and die under natural processes. Course woody material would be recruited onto the forest floor as trees die.

The No Action alternative would have no direct or indirect effects of trampling or compaction on the understory shrub or herbaceous vegetation within the project area due to no harvest activity.

Alternative 2 – Proposed Action

Direct Effects:

The potential direct effects to Federal TEPS and/or State TESSC and other plants of concern for the WMNF from single-tree, uneven-age, or clearcut harvests within the Nubble Project Area are anticipated to be overall relatively localized, minor to none respectively. Potential direct effects to understory vegetation include trampling and/or soil compaction by machinery during summer or fall harvest operations. However, designated skid trails would minimize understory vegetation and soil disturbances during summer or fall harvest operations, and the majority of units are proposed for winter harvest when snow and frozen ground conditions would minimize potential effects to understory vegetation. Also, wet areas which some plants favor are routinely excluded from harvest units and skid trail layout.

Indirect Effects:

Potential indirect effects of Alternative 2 include increased or varied sunlight reaching the forest floor from opening the canopy via harvest treatments, which could benefit shade intolerant plants such as R9-listed sensitive species clustered sedge that favors open woods and clearings, but would not benefit shade tolerant plants such as broad-leaved twayblade that favors deep shade.

There are no known documented occurrences of listed plant species within the harvest units of the project area. Herbaceous plants in adjacent uncut stands would also be affected up to approximately 100 feet from the edge of the units proposed for clearcutting. The effects include changes in environmental gradients (i.e. heat, sunlight reaching the ground floor and moisture, and less

competition from intolerant species) created by clearcutting, increased competition from intolerant species, or direct disturbance from harvesting activities.

Uneven-aged management can have less impact on herbaceous plant species than even-aged management. Single-tree and group selection harvesting can result in fewer changes in environmental gradients.

Alternative 3

This alternative emphasizes even-aged management via several clearcuts. The effects discussed for group selection in Alternative 2 would be the same for Alternative 3, but would occur on more stand acres. The effects on the understory shrub and herbaceous vegetation would be nearly the same as Alternative 2 with slightly more group selection and more clearcutting.

Summary of Effects to Federal and State-Listed & Other Plants Of Concern on the WMNF:

The following table summarizes the effects determinations rendered in the Nubble BE/BA for Federally-listed threatened, endangered, proposed and sensitive (TEPS) plant species (see the Nubble BE/BA in the Project File). The Vegetation Report discloses the analysis of potential effects to other plants of concern on the WMNF.

Table 14: BE/BA Effects Determinations for Federal TEPS Plants for the Nubble Project Area

Federal Status	TEPS SPECIES		EFFECTS DETRMINATIONS
R9-Sensitive	Bailey's sedge	*(Carex baileyi)*	The proposed action and Alternative 3 may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species of Federally-listed Region 9 Sensitive plant species having low probability of occurrence within the Nubble Project Area.
R9-Sensitive	Clustered sedge	*(Carex cumulata)*	
R9-Sensitive	Squirrel-corn	*(Dicentra canadensis)*	
R9-Sensitive	Goldie's woodfern	*(Dryopteris goldiana)*	
R9-Sensitive	Broad-leaved twayblade	*(Listera convallarioides)*	
R9-Sensitive	Chilean sweet cicely	*(Osmorhiza berteroi)*	
R9-Sensitive	American ginseng	*(Panax quinquefolius)*	
R9-Sensitive	Nodding pogonia	*(Triphora trianthophora)*	

In Summary: There are no documented occurrences of Federal or State-listed or other plants of concern for the WMNF having a very low probability of occurrence within the Project Area (Tables 11 and 12; Vegetation Report, Project File). Based on marginal amounts of suitable habitat present, the potential direct effects to listed plants include a low risk of trampling and/or soil compaction by machinery during summer or fall harvest operations. However, designated skid trails would minimize overall understory vegetation and soil disturbances during summer or fall harvest operations, and the majority of the stands are proposed for winter mitigation season of harvest when snow and frozen ground conditions would minimize potential effects to understory vegetation. Also, some of the State-listed and other plants of concern having low probability of occurrence within the Project Area favor wet areas that are excluded from harvest units and skid trail layout.

Indirect effects of the Proposed Action and Alternative 3 include increased sunlight reaching the forest floor from open canopy conditions via harvest treatments, which could be beneficial to shade intolerant plants that favor open woods and clearings, but negative benefit to the shade tolerant species that favor deep shade.

If listed plants were not discovered prior to project implementation, any of the action alternatives could cause some unavoidable impacts from management activities (USDA-FEIS 1986, IV 67-68). In general, the unavoidable impacts are most likely to correspond to the relative amounts of total acres treated (i.e. the greater the acres treated via clearcutting, the greater the potential to affect an undiscovered plant compared to less acres treated via single tree). These impacts would be minimized by winter harvesting mitigation proposed for most of the project area, which would shield the ground from soil compaction and disturbance. If additional listed plants are found during implementation, the Sale Administrator would alert the District Biologist and protective measures would be taken.

Since there are no documented occurrences and Standards and Guidelines would minimize potential effects, the Proposed Action and Alternative 3 may impact individuals, but would not likely contribute to a trend towards listing or cause a loss of viability to the population or species of Federal or State-listed or other plants of concern on the WMNF having low probability of occurrence shown in the following table and in the Vegetation Report (Project File).

Table 15: Effects Determinations for State Listed Plants Having A Very Low Probability Of Occurrence in Project Area.

Ciliated aster	Pale early violet	Large purple-fringed orchid		Alpine speedwell	Alternatives 2 &3 would not adversely affect NH State-listed
Bosc's pigweed	Kidney-leaved violet	Large yellow lady's-slipper	Rock sandwort	Purple crowberry	

Squaw-root	Meadow horsetail	Walking-fern spleenwort	Flowering dogwood	Hound's tongue	or other species of concern for the WMNF.
Jack pine		Large-spored quillwort	Trailing arbutus	Canadian germander	
Millet-grass	Pink lady's slipper	Green adder's-mouth		Dutchman's breeches	
Hidden sedge	White-fringed orchid	Small yellow lady's-slipper	Many leaved bulrush		

3.2.1.6 Cumulative Effects on Federal and State-listed and Other Vegetation of Concern

The analysis area for past, present and reasonably foreseeable future effects to Federal and State-listed and other plants of concern for the WMNF included the Nubble Project Area, and the forest-wide planning area to address population viability.

Alternative 1

The No Action Alternative would cause no direct effects of trampling vegetation or soil compaction in the project area due to no harvest activity, thus no cumulative effects to Federal or State listed or other plants of concern on the WMNF.

Alternatives 2 - 3

The Proposed Action and Alternative 3 would cause relatively minor to no direct or indirect effects to listed vegetation resources, therefore there would be no cumulative effects.

3.2.2 TERRESTRIAL WILDLIFE RESOURCES

Wildlife resource objectives for MA 2.1 and 3.1 lands are to provide a diversity of habitat types for a wide array of wildlife species with emphasis on early-successional species in management area 3.1 (USDA-LRMP 1986a, III-30, 36). The proposed Nubble Project Area is located in HMUs 110 and 111 within Management Area 2.1 and 3.1 lands, which allow timber harvesting (see Appendix E). The Proposed Action and action alternatives of the Nubble Vegetation Management Project (at various degrees) respond to the purpose and need for greater wildlife habitat diversity to maintain wildlife populations (USDA-FEIS 1986, I-9).

White Mountain National Forest Plan Management Indicator Species (MIS)

This EA Appendix F1 displays the Probability of Occurrence Analysis of WMNF MIS for the Nubble Project Area. The occurrence of MIS and/or suitable habitat was based on but not limited to the following sources:

- Known documented occurrence and/or extirpation (NH Natural Heritage Inventory database & USFWS list reviews).
- Literature reviews of MIS life history & suitable habitat requirements (DeGraaf et. al 1992; DeGraaf & Yamasaki 2001).
- Site-specific, multi-seasonal field surveys during snow / snow-free and leaf on / off conditions (Forest Service).
- Analysis of data from forest-wide wildlife monitoring transects & monitoring reports (USDA-FS 1993,94,96,99,2000, 2001).
- Analysis of the amount and quality of existing community types, age classes, and MAs present in the Nubble Project Area suitable for MIS (Forest Service stand exam data, CDS database, HMU 110 & 111 analysis, & ID-team field reviews).

Nubble Project Area: Table 15 shows nine WMNF MIS have no probability of occurrence within the project area due to species extirpation and/or non-suitable habitat present (see EA Appendix F1). Suitable habitat is defined as meeting a species' life history requirements such as food, cover, shelter, breeding, nesting, and young rearing (see Literature reference list). The no occurrence determination takes into account the potential for incidental or occasional travel through or fly-over of the Project Area by wildlife.

Table 16 discloses that 15 WMNF MIS have potential to occur within the Nubble Project Area at various times, and shows their population trend and viability within the forest-wide planning area (per 36 CFR 219.19(a)(6)). The Federally-listed Canada lynx and R9-listed Sensitive Species peregrine falcon are WMNF MIS. The USFWS lists the Canada lynx as extirpated in NH (USDI Federal Register 1998 and BO 2000). Due to the S&Gs for the protection of suitable habitat per the National Canada Lynx Conservation Assessment and Strategy, the potential effects to MIS Canada lynx are disclosed in the TEPS section of this analysis and the Nubble BE/BA. The potential effects to the R9-listed SS peregrine falcon and the State-listed threatened American marten and their population trends and viability are disclosed in the TEPS section of this EA and the Nubble BE/BA. The MIS American black duck and MIS

Eastern brook trout are discussed in the Aquatics Section.

Table 16: MIS species having no probability of occurrence within the Nubble Project Area.

WMNF MIS	RATIONALE FOR NO OCCURRENCE WITHIN THE NUBBLE PROJECT AREA
Eastern Towhee	Non-suitable habitat = no oak, or regen / young age class in pine community type.
Gray-checked (Bicknell's) Thrush	Non-suitable habitat = no high elevation spruce/ fir habitat or MAs 5, 6, 9.
Blackpoll Warbler	Non-suitable habitat = no high elevation spruce / fir or young habitat or MAs 5, 6, or 9.
Common Loon	Non-suitable habitat = no large bodies of water greater than 10 acres supporting fish.
Osprey	Non-suitable habitat = no large bodies of water greater than 10 acres supporting fish.
Gray Squirrel	Non-suitable habitat = no oak community type or MA 7.1 within the Project Area.
Canada Lynx	Extirpated (USDI 1998, 2000). Addressed CLCAS S&Gs as suitable habitat is present.
Sunapee Trout	Extirpated & non-suitable habitat = no deep coldwater bodies with shallow gravel bars.
Robbins' Cinquefoil	Non-suitable habitat = no alpine zone habitat within the Project Area.

Evaluation Monitoring Of The White Mountain National Forest Plan Wildlife Strategy

Following an appeal of the 1986 WMNF Forest Plan, the WMNF established a Committee of Wildlife Scientists (COS). The COS designed peer reviewed survey protocols for systematic evaluation monitoring of wildlife responses from implementation of the wildlife habitat management strategy as described in the 1986 WMNF Forest Plan. As a result, there are 360 permanent monitoring plots located on 45 miles of transect lines well distributed Forest-wide within managed, unmanaged adjacent managed, and remote unmanaged lands on the forest (COS terminology). FS personnel conducted large mammal winter track and small mammal and amphibian trap monitoring surveys on the forest-wide transects during 1993-97 and directed searches for northern bog lemming during 1995-97 per COS and Forest Plan MIS monitoring protocols (USDA-LRMP 1986a, VII-B-24).

Information from wildlife monitoring transect lines located within the site-specific Nubble Project Area and the larger HMUs 110 and 111, along with information from sources listed above were used to infer and validate the probability of occurrence of wildlife species for the Nubble Project Area (USDA-FS Monitoring Reports 1993, 1996, 1999, 2000).

White Mountain National Forest Plan MIS Population Trends and Viability Assessment

The WMNF recently completed a comprehensive evaluation of several years of monitoring data gathered from the wildlife monitoring transect lines within the forest-wide planning area entitled, *"Evaluation of Wildlife Monitoring and Population Viability: WMNF MIS"* (USDA-FS 2001a) (see the Nubble project file).

In summary, forest-wide breeding bird monitoring (including MIS) on the WMNF since early 1990s showed cyclic population dynamics through 1996. Forest-wide small mammal monitoring conducted through 1995 indicated some between-year population differences (may reflect differences in mobility and not population size). Small-sized herbivore (small mammal and squirrel) populations spiked in 1995 most likely due to high mast supplies in 1994. Forest-wide large mammal population monitoring via snow tracking surveys documented the presence of bobcat and MIS American marten during all survey years. MIS white-tailed deer and MIS snowshoe hare showed cyclic population dynamics. NH hunter mail-in survey results reinforced the finding that MIS deer populations are distributed statewide with the MIS deer population being relatively stable. MIS snowshoe hare were found to be more prevalent in areas with vegetation management than without. Other species did not show a measurable difference between managed and unmanaged areas of the WMNF (USDA-FS 1996). Tracks or sign of Canada lynx, timber wolf, or cougar were not detected. Recent forest-wide surveys conducted during 1999 through 2002 detected no lynx.

An analysis of the amount and quality of habitat available forest-wide for WMNF MIS was conducted (USDA-FS 2003). This analysis included a query of the WMNF Combined Database system of Forest Types by Age Class and review of WMNF Monitoring Reports and appropriate literature (see the project file).

Table 17: Potential MIS Occurrence in the Nubble Project Area & Population Trends & Viability Within the Forest-Wide Planning Area Per 36 CFR 219.19

Community */Community Type*	**MA**	**MIS**	**Forest-wide Planning Area Population Trends & Viability Determinations (USDA-FS 2001a).**
Northern Hardwood (includes spruce and swamp hardwoods) / *Regeneration*	3.1	Chestnut-sided warbler	Declining population trends at global level and in portions of Physiographic Area 28. The past 8 yrs of WMNF monitoring shows a decline, which may continue with declining early-successional habitat. However, there is no danger of losing this warbler from the White Mountain Subsection in the near term & population viability is nationally & locally secure.
Northern Hardwood (includes spruce and swamp hardwoods) / Mature and Over-mature	2.1	Northern goshawk	Goshawk populations in Physiographic Area 28 appear stable with no indication of population declines anywhere within their range. Goshawk population viability and distribution would be maintained under the current WMNF management practices.
Paper birch / Aspen *Mature and Over-mature*	2.1	Broad-winged hawk	The MIS broad-winged hawk population trend on the WMNF was relatively stable over the 8-year period 1992-1999, with a peak in 1994 and a low in 1998. The forest-wide population is considered viable and well distributed.
Paper birch = *Regen & Young* **Aspen** = *All Ages*	3.1	Ruffed grouse	MIS ruffed grouse population trends on the Forest fluctuated widely over an 8-year period from 1992-1999, but their populations are viable statewide & on the WMNF in the near term.
Spruce / Fir *Regen & Young*	3.1	Snowshoe hare	The local snowshoe hare population is viable & stable in the near term, with cyclic fluctuations.
Pine *Regen & Young*	3.1	Northern (Dark eyed) junco	The MIS Northern junco population is viable and well distributed in the near term within the White Mountain Subsection (which includes the forest-wide planning area).
Spruce / Fir *Mature & Over-mature*	2.1	Cape May warbler	Forest-wide WMNF monitoring data indicate a fluctuating population trend for Cape May warbler, and the population is considered viable within the forest planning area.
Pine *Mature & Over-mature*	3.1	Pine warbler (intermixed pine)	The MIS pine warbler population viability on the WMNF is currently viable and stable.
Hemlock / *All ages*	3.1	White-tailed deer	Managed as game species and harvested annually, populations are viable in the near term with deer population trends fluctuating.
Upland Openings Community *Forest Ecotone - Grass, Forb, Apple*	3.1	Eastern kingbird	A declining population trend in Physiographic Area 28, yet ranked secure in NH and Maine. The population is considered viable, yet the White Mountain Subsection does not provide much land in openings suitable for kingbirds.
		Eastern bluebird	Overall, stable population trend for Physiographic Area 28 from 1980-1999. This species has never been reported during annual breeding bird surveys on the WMNF, probably due to lack of larger openings, yet is common in large openings off the WMNF. Local population marginally viable due to few large openings on the forest.
Upland Openings Community *Forest Ecotone - Shrub*	3.1	Mourning warbler	A stable population trend in Physiographic Area 28 over the past 30 years. Forest-wide breeding bird data show significantly declining numbers in MAs 2.1 & 3.1, but clearcutting has declined on the WMNF. This warbler is ranked secure in all New England states & Canada. The local population is considered viable.

Community /Community Type	MA	MIS	Forest-wide Planning Area Population Trends & Viability Determinations (USDA-FS 2001a).
Mixed Forest Type *Varying age classes.*	All	American marten	The State-listed threatened American marten population on the Forest is believed increasing and not yet considered viable. See Appendices F for complete analysis.
Wetlands and Water		American black duck	Could occur in Eastman Brook and is addressed in the Aquatics Section.
Permanent Waterbodies		Eastern brook trout	Could occur in Eastman Brook and is addressed in the Aquatics Section.

Based on HMU analysis, IDT and site-specific field surveys, literature and database reviews of species' habitat requirements and known documented occurrence, and personal communication with experts, 9 WMNF MIS have no likelihood of occurrence within Nubble Project Area due to extirpation and / or no suitable habitat present. See Appendix F1 for Probability Of Occurrence Analysis of MIS for the Nubble Project Area. *Suitable habitat* = Meets life history requirements. *No occurrence* = includes occasional or incidental travel or fly-over of the Project Area by some species.

3.2.2.1 Terrestrial Wildlife Affected Environment

The state of New Hampshire is predominately forested, which is steadily maturing as described in the Forest Statistics For New Hampshire: 1983-1997 (USDA, 2000a). The WMNF Forest Plan FEIS and the annual monitoring reports state there is more habitat available for species that use mature or over-mature habitat. Based on current analysis of age class and community types of the existing habitat conditions within HMUs 110 & 111, there is a lack of regeneration age class and general lack of oak/pine, spruce/fir, paper birch, and aspen community types within the Nubble Project Area compared to Forest Plan desired condition. The Nubble Project Area is dominated by middle to older aged closed canopy habitat (see Project File Appendix E HMU 110 & 111, and forest-wide CDS analysis of forest type and age class). Of the songbird species on the Forest, approximately half are Neotropical migrants and more than half of these birds use early-successional habitats for all or part of their life cycle. There is a lack of regeneration-age habitat preferred by these species (USDA-LRMP 1986a, VII-B-2).

Site-Specific Nubble Project Area Field Surveys and Reviews (FS ID-Team & NHNHI):

Forest Service field surveys and reviews documented that the Nubble Project Area does not contain special, unique or exemplary communities such as old growth stands, mapped alpine bogs, ravines, meadows, high cliffs, rock talus slopes, vernal pools, caves, or mining tunnels (FS ID-Team notes). None of the ecosystems or habitats affected by the no action or action alternatives are scarce, unique, or regionally at risk. Forested wet areas and the small inactive beaver pond on the unnamed Little River tributary are located outside the proposed harvest units. There are no known wetlands or vernal pools within proposed harvest units, landings, or along skid trails of the Nubble Project Area.

Old Growth Habitat: The NHNHI database reviews did not document any stands specifically identified as old growth within the Nubble Project Area (NHNHI-Cairns 2003, FS-HMU Analysis Project File Appendix E). MA 6.1 (located outside of and nearby the Nubble Project Area) provides a large, contiguous area of uneven-age, interior forest habitat. In addition, 10% of the management area 2.1 and 3.1 lands within HMUs 110 and 111 are managed as an extended over-mature rotation component. Furthermore, approximately 435,000 acres (56% of the 780,000 acre WMNF) are designated in Management Areas 5.1, 6.1, 6.2, 6.3, 8.1, 9.1 and 9.2 that do not feature vegetation management across the WMNF forest-wide landscape. At the landscape level, this habitat is left to the natural process of forest succession for development of old-growth characteristics available to wildlife species that use features such as cavities, snags, downed large woody material, fungi, moss, lichens, and closed canopy with sparse under-story conditions.

In summary, the site-specific stand exam and interdisciplinary team field reviews during snow free and leaf off periods, confirmed that the Nubble Project Area contains predominately northern hardwood forest and is lacking aspen and paper birch, spruce-fir, hemlock, and pine-oak communities. The hardwood forest typically provides habitat for general wildlife including but not limited to the species shown

in Table 17. The Aquatic Section analyzed the potential direct, indirect, and cumulative effects to fish, amphibians, and reptiles.

Table 18: General Wildlife Species Typically Associated with the Northern Hardwood Forest (DeGraaf et al. 1992).

Large Mammals	Small Mammals	Songbirds/Hawks	Amphibians/Reptiles	Invertebrates
Moose White-tailed deer Black bear Coyote Fisher Fox	Woodland jumping mouse Masked & short-tail shrew Meadow vole Porcupine Chipmunk & Red squirrel Snowshoe hare Big and Little brown bat Eastern small footed bat Northern long-eared bat Mink, Skunk, Raccoon	Northern junco Black-capped chickadee Chestnut-sided warbler Cape May warbler Downy woodpecker Ruffed grouse Red-tailed hawk Broad-winged hawk Barred owl and Crow	N. dusky salamander Red spotted newt Wood and green frog Eastern garter snake American toad Wood turtle (See the Aquatics Functional Report)	Grasshopper Black fly Mosquito Deer tick Beetle sp. Butterfly & moth Earthworm Springtail

Site-specific FS field reviews during various times of the year documented the occurrence of several MIS within the Nubble Project Area. The FS also conducted winter track and small mammal trap monitoring during 1993-97 in hardwood and softwood community types on the Beaver Brook and Gale River transect lines located within the Nubble Project Area and within HMUs 110 and 111.

- The Beaver Brook monitoring line bisects the Nubble Project Area in MA 2.1 and 3.1 in HMUs 110 and 111;
- The Gale River monitoring line is located adjacent to the Nubble Project Area in MA 6.2 in HMU 111.
- The Pemigewasset Wilderness Transect (remote land) is located south of the Nubble Project Area.

Winter track and small mammal trap monitoring along the Beaver Brook transects detected occurrence of several MIS as well as the Gale River and Pemigewasset River (in similar habitat community types as found in the Nubble Project Area) located adjacent to the Project Area.

Large Mammals (MIS white-tailed deer and Canada lynx (see TEPS section)): Winter track monitoring along the above wildlife transects detected MIS white-tailed deer within the Project Area. Interdisciplinary team field reviews documented moderate levels of existing deer use, such as winter fecal pellets, browsing pressure, bark scarred trees, and scattered game trails throughout the Nubble Project Area. The MIS white-tailed deer and do occupy, use, and travel through the Nubble Project Area at various times of the year. In New England during severe winter conditions, the MIS white-tailed deer use dense softwood stands (often hemlock) as overwintering habitat (yard) and browse nearby hardwoods and softwoods adjacent to or within the concentrated softwoods (Reay et al. 1990).

Pre-project level monitoring of the Nubble Project Area included site-specific field reviews of the softwood component. Reviewers ensured the proposed prescriptions and the WMNF Forest Plan S&Gs would perpetuate this community type and habitat conditions necessary to support wintering populations of MIS white-tailed deer. Site-specific field reviews documented that the proposed harvest units of the Nubble Project Area contain several softwood stands. The softwood forest type within the project area does not function as core or primary deer (yard) overwintering habitat. There are no historic documented core overwintering deer yard(s) within the proposed harvest units of the Nubble Project Area (district records; personnel comm. with Will Staats, NHFG Regional Biologist). NH Fish and Game manage MIS white-tailed deer as a game species harvested annually and their populations are considered viable in the state and on the forest, with MIS white-tailed deer trends fluctuating (NHFG 2002, USDA-FS 2001a).

The proposed Nubble Project Area contains beech trees, which provide hard mast (beechnuts) and soft mast (buds) used by MIS white-tailed deer, MIS ruffed grouse, black bear, red squirrel, and wild turkey (Martin et al. 1961). Reviewers noted relatively few bear clawed and broken topped beech trees from foraging bears throughout the Project Area. Field reviews documented no large mammal

denning sites such as bear dens within the units proposed for harvest. NH Fish & Game manages black bear as a game species that is harvested annually and populations are viable at 4,000 with increasing trends and well distributed in all counties including the WMNF (NHFG 2002).

Small Mammals (MIS snowshoe hare and American marten (see TEPS Section)): Forest Service field review of the Nubble Project Area during winter documented the occurrence of MIS snowshoe hare.

The Forest Service conducted winter track and small mammal trap monitoring during 1993-97 in hardwood and softwood community types on the wildlife transect lines described above located within the Project Area and within HMUs 110 and 111. Other species detected were fisher, fox, coyote, red squirrel, and common rodents mice, vole, and shrew (unpublished data). Although none were detected during the winter track surveys associated with the general project area, the state-listed threatened and MIS American marten could occur in the project area (see Appendix F). Pre-project level monitoring of the Nubble Project Area included site-specific field reviews of the softwood component and review of the proposed prescriptions and S&Gs designed to perpetuate this community type and habitat conditions necessary to support populations of MIS snowshoe hare and MIS American marten. MIS snowshoe hare populations fluctuate widely over a period of several years, but their populations are viable statewide and on the WMNF. MIS American marten population trends are believed to be increasing on the forest (USDA-FS 2001a).

Upland Game Birds (MIS ruffed grouse): The Forest Service interdisciplinary team field reviews documented the MIS ruffed grouse present in the Nubble Project Area. This analysis assumes wild turkey and American woodcock occur within the small forest openings and the mast producing areas of the project area. Pre-project level monitoring of the Nubble Project Area included site-specific field reviews of available habitat and review of the proposed prescriptions and standards and guidelines designed to create and/or perpetuate the community types necessary to support populations of MIS ruffed grouse. MIS ruffed grouse populations fluctuate widely over a period of several years, but their populations are viable statewide and on the WMNF (USDA-FS 2001a).

Neotropical Migratory Songbirds & Raptors (MIS Chestnut-sided, mourning, Cape May, & pine warbler; Northern junco; Eastern kingbird & bluebird; Northern goshawk & broad-winged hawk): Approximately half of the bird species on the White Mountain National Forest are Neotropical migratory songbirds that use early-successional habitat for part or all of their life cycle. The existing condition of vegetation in the Nubble Project Area provides nesting and/or foraging habitat for neotropical songbirds and hawks using mature or over-mature habitat. However, analysis of the vegetation composition of HMUs 110 & 111 shows a shortage in the early-successional (0-9 year old) regeneration age class. Ongoing since 1992, the WMNF and NH Audubon monitor songbird and hawk populations on the forest-wide wildlife transect lines. Preliminary data from ongoing bird monitoring show a declining population trend of five Neotropical migratory bird species in the White Mountain National Forest over the past eight years (NHFG 2000a). All five species: the MIS chestnut-sided warbler, MIS mourning warbler, common yellowthroat, rose-breasted grosbeak and the veery, are dependant on early-successional habitat. The MIS mourning warblers show relatively stable population trends in the Physiographic Area 28 over the past 30 years. Forest-wide breeding bird survey data show significantly declining numbers in Management Areas 2.1 and 3.1 lands where active vegetation management is allowed, however, the amount of clearcutting on the WMNF has declined.

NH Audubon conducted directed searches across the forest for MIS Northern goshawk and found no nests or hawks near the Nubble Project Area (Audubon 1993-94). Also, there are no known historic documented occurrences of MIS northern goshawk, MIS broad-winged or State-listed Cooper's hawks or their nests in or near the Nubble Project Area (Foss 1994). Pre-project level monitoring of the Nubble Project Area included site-specific reviews of suitable raptor habitat. Reviewers ensured the Forest Plan S&Gs and proposed prescriptions were

designed to provide the communities and habitat conditions necessary for maintaining MIS songbird and MIS hawk populations. As a result, FS stand exam and ID-team field reviews did not find active nests in suitable raptor habitat of the Nubble Project Area (Beaver Brook and Gale River Wildlife Monitoring 1993 through 2002, and ID-Team field reviews).

Federal Listed and Eastern Region 9 Sensitive Species

Per Forest Service manual direction (USDA-FS Manual 2670), the Forest Service completed a site-specific project-level Biological Evaluation /Assessment (BE/BA) of the potential effects of the No Action and action alternatives on Federally-listed threatened and endangered and Eastern Region 9-listed Sensitive Species (TEPS) and their habitat. See the Nubble BE/BA in the project file. This analysis summarizes the probability of occurrence of Federally-listed TEPS for the Nubble Project Area. The Nubble BE/BA based the probability of occurrence of Federally-listed TEPS for the Nubble Project Area on suitable habitat present and/or known documented occurrence and/or species extirpation. Table 18 discloses the TEPS wildlife species having a very low to a medium probability of occurrence within the Nubble Project Area. These same species were also addressed in the forest-wide programmatic Biological Assessment of continued implementation of the 1986 WMNF Forest Plan (USDA-FS 1999):

Table 19: TEPS Wildlife Species Having Probability of Occurrence Within The Nubble Project Area.

FEDERAL STATUS	TEPS SPECIES		PROBABILITY OF OCCURRENCE
Threatened	Bald eagle	*(Haliaeetus leucocephalus)*	Very low = migration flyover
Threatened	Canada lynx	*(Lynx canadensis)*	Extirpated = suitable habitat *
Endangered	Indiana bat	*(Myotis sodalis)*	Very low = summer transient
R9-Sensitive	Peregrine falcon	*(Falco peregrinus anatum)*	Low = summer forage / flyover
R9-Sensitive	Eastern small-footed bat	*(Myotis leibii)*	Very low = summer
R9-Sensitive	Northern bog lemming	*(Synaptomys borealis sp.)*	Very low = potential in wet areas.
R9-Sensitive	Wood turtle	*(Clemmys insculpta)*	Very low = potential in riparian areas.
Canada lynx is addressed due to suitable habitat present per CLCAS.			

In summary, NHNHI database reviews revealed no known documented occurrence of TEPS and site-specific FS field surveys of suitable habitat of the project area during various times of the year documented no sightings of wildlife TEPS or their sign such as tracks, dens, nests, or scat (NHNHI 2003; On going FS field reviews). The WMNF (including the Nubble Project Area) is not designated "critical habitat" by the USFWS in recovery plans for Eastern timber wolf, cougar, or Indiana bat. There is no proposed recovery plan for Canada lynx. The Nubble BE/BA determined that there are relatively medium to high amounts of human activity associated with the Project Area (i.e. dispersed campsites along Gale River Loop Road and Haystack Road; Gale River and North Twin Trails and trail head parking lots; nearby towns of Bethlehem and Twin Mountain; and State Highway Routes 3 & 302). The Nubble Project Area is considered non-suitable denning or rearing habitat for the extirpated species Canada lynx, Eastern timber wolf, and cougar. These large mammals have large home ranges, and the existing forested habitat within the project area is not a limiting factor in these species' life history requirements. Although extirpated, the Nubble BE/BA addressed the Canada lynx due to the national level Canada Lynx Conservation Assessment and Strategy agreement. The bald eagle and peregrine falcon may flyover the general area, but do not nest within the Nubble Project Area (Foss 1994, Audubon 2003) and are not expected to establish nesting territories in the Nubble Project Area in the future.

Due to minimal amounts of potential suitable habitat within the Nubble Project Area, there is a very low probability of occurrence of Eastern Region 9 sensitive species Northern bog lemming and wood turtle. This Report discloses a summary of the Nubble BE/BA determinations of potential effects to Federally-listed TEPS for the Project Area. This analysis discloses the analysis of the effects to TEPS from multi-use activities at the national and forest-wide levels.

State Listed and Other Wildlife of Concern For theWMNF

The NH Fish and Game, NH Audubon Society,

or NHNHI did not express specific concerns for State-listed threatened, endangered, or special concern species (TESSC) for the Nubble Project Area during public scoping. The northern hardwoods, mature trees with cavities, and riparian areas could provide potential suitable habitat for TESSC and other wildlife of concern. If suitable habitat was present within the project area for species documented or suspected as occurring on the WMNF, analysis of potential effects was based on the assumption that suitable habitat could be occupied. Wildlife Specialist's Report Appendix F and G in the project file discloses the probability of occurrence of State-listed TESSC and other wildlife of concern for the Nubble Project Area.

3.2.2.2 Terrestrial Wildlife Resources – Related Mitigation Measures

In addition to the Forest and Management Area-wide Standards and Guidelines listed in the Forest Plan III-15, Appendix VII-B (including the WMNF Forest Plan TES amendment, USDA 2001), the following specific mitigation or coordination measures would be used under any action alternative:

- Retain mast producing beech trees heavily used by black bear unless a safety hazard, or located in regeneration units.
- Retain existing large downed woody material in proposed harvest units on the forest floor where feasible.
- All action alternatives would retain snags per USFWS BO Terms & Conditions and Forest Plan TES Amendment for the protection of Indiana bat unless a safety hazard. If snags are felled, retain as large woody material on the ground.
- All action alternatives are consistent with applicable standards and guidelines outlined in the Canada Lynx Conservation Assessment and Strategy for the maintenance of suitable lynx habitat.
- All action alternatives would use non-invasive seed mix and straw mulch (where and when available) and as needed to prevent the introduction of invasive exotic plant species during revegetation closure work.

3.2.2.3 Environmental Consequences to Terrestrial Wildlife Resources

Potential Direct and Indirect Effects on Wildlife Resources

Most of the wildlife species expected to occur within the Nubble Project Area are also found on other parts of the District, across the Forest, and few species could occur on suitable portions of private land located outside of the project area.

In general, any action (including No Action) that affects vegetation has the potential to affect wildlife. The potential direct and indirect effects from vegetation management and reconstruction of existing forest road, skid trail and landings could be beneficial for some MIS species, yet neutral or negative for others based on their specific or generalist habitat needs.

The Wildlife Functional Report Appendix F in the project file discloses the potential effects to State-listed TESSC wildlife and discloses a Probability of Occurrence Analysis that several MIS could occur within the Nubble Project Area. Table 19 discloses a summary comparison of the potential direct and indirect effects to the amount and quality of habitat available to MIS by alternative. Table 20 discloses the cumulative effects on WMNF MIS population trends and viability within the forest-wide planning area.

Alternative 1 - No Action

Reconstruction of existing forest roads, reuse of skid trails or landings, woody vegetation removal, and noise from timber harvest activity would not occur in the Nubble Project Area at this time. Routine maintenance of existing roads or fire suppression activities could occur in the area independent of vegetation management.

Direct Effects

Alternative 1 would cause no direct effects of tree removal or compaction of snow or soil substrates or noise from vegetation management activity. Therefore, there would be no direct effects of temporary displacement or interruption of established territories or travel patterns of wildlife species to, from, or within the proposed Nubble Project Area from vegetation management activities.

Changes in the existing condition of vegetation community type or age class composition would occur through the natural process of forest succession or large-scale disturbances (fire, hurricane, ice storm, drought, or insect and disease infestations). The No Action alternative would perpetuate a mature and over-mature forested habitat condition, which is suitable to bark gleaners and cavity-dwelling species such as woodpeckers, owls, forest bats and flying squirrels (Tubbs et al. 1987).

The MIS northern goshawk, which was not detected during Beaver Brook and Gale River

wildlife monitoring or multiple Forest Service field reviews of the project area (FS Monitoring Reports ID-Team reviews), and the MIS Cape May warbler (if present) would benefit from no change in the existing condition of the mature and over-mature, even-aged class of northern hardwoods and spruce/fir respectively. Forest interior species such as the ovenbird and wood thrush would also benefit from the perpetuation of the mature northern hardwood community type. Species preferring mature closed-canopy and climax forest conditions, such as the MIS broad-winged hawk and the MIS ruffed grouse representative of the mature/over-mature paper birch and aspen community respectively would benefit from the No Action alternative in the short term.

However, analysis of the HMUs 110 & 111 (see Vegetation Report in Project File) indicates a need for creating a mixture of multiple age and size classes of trees in northern hardwood community type to meet the Forest Plan desired condition (DC) for habitat diversity. There is a disproportionate amount of habitat available at the landscape level for species requiring regeneration age class, as adjacent private lands do not contribute substantially to this age class diversity. The No Action alternative does not meet the Purpose and Need and would not move the forest towards the DC for the regeneration age class in the northern hardwood, spruce/fir; nor paper birch community types; nor provide wildlife habitat diversity in managed lands identified in the Forest Plan (USDA-LRMP 1986a, III 30-35, III 35-41); nor meet the DC for HMUs 110 & 111. The opportunity to create additional amounts of or perpetuate paper birch or aspen within the project area would not occur, and without a catastrophic natural event, these community types would decrease over time.

Indirect Effects

The No Action would cause an adverse indirect effect of a decline in habitat diversity in the early-successional age class and the paper birch /aspen community types. The No Action would not provide an opportunity to increase the amount of early-successional (0 to 9 year old regeneration age-class) or next successional young-aged hardwood type, required by various life stages of Neotropical migratory birds (including several MIS). No Action would cause an adverse indirect effect on the MIS mourning warbler, MIS chestnut-sided warbler, and the MIS Eastern kingbird representative of permanent upland opening community and early-successional and young age class (sapling) in the northern hardwood community type.

The No Action over time has a greater potential for accumulation of downed woody material and large diameter cavity trees compared to the harvest units proposed for the action alternatives. However, Alternative 1 would not provide an opportunity via harvest treatments to increase the paper birch and aspen component or pin cherry, raspberries, and other mast producing vegetation. Over time the loss of paper birch or aspen types would cause long-term, adverse indirect effects on MIS broad-winged hawk and MIS ruffed grouse associated with these community types, and cause a potential decline in the diversity of wildlife MIS favoring early-successional habitat, such as white-tailed deer and several neotropical migratory song birds in the project area.

There would be a lost opportunity to stimulate hardwood regeneration or increase available browse adjacent to the existing scattered softwood component, as recommended for moose and MIS white-tailed deer habitat management (Reay et al. 1990). Alternative 1 would not increase the amount of softwood spruce/fir regeneration or release softwood regeneration for MIS snowshoe hare, which is the primary prey base for MIS Canada lynx (see the BE/BA for detailed analysis for potential effects to Canada lynx habitat).

Indirect effects over time would include declines in habitat diversity, and these MIS and general wildlife species would not find suitable habitat within the project area. There would be a potential decline in overall diversity via loss of vegetation age class and type and associated wildlife in the Nubble Project Area (NHFG 1996).

Alternative 2 - Proposed Action

Trees would be felled under even-aged management via 114 clearcut and 66 thinning treatment acres. Uneven-aged management would include approximately, 416 single-tree selection (approximately 25% of the sand basal area); 124 group selection (1/10th to 2 acre size); totaling approximately 720 treatment acres. Approximately 5.5 miles of pre-haul road maintenance would occur along existing Forest Roads.

Direct Effects

Alternative 2 would cause the direct effect of displacing some wildlife species. The timing of harvest would directly affect species differently (i.e. during breeding and young rearing and winter survival). Summer harvesting could affect arboreal and ground dwelling species that use trees for hiding cover, nesting, or foraging habitat. Fall harvesting could affect fewer arboreal or ground dwelling species, but could potentially affect species breeding and foraging on fall mast. Winter harvest potentially affects less ground dwelling species and may affect species using trees for winter dormancy habitat. Generally, species with home ranges larger than the proposed harvesting units could avoid the area during vegetation management activity.

Forest-wide S&Gs would maintain 1.25 to 2.50 sq. ft/acre of trees with an 18-inch dbh at breast height as existing and future wildlife trees within the proposed harvest units (USDA-LRMP 1986a,

III-15, VII-B-21, S&G #28). This would mitigate the direct effect of tree removal on wildlife species. Also, the USFWS BO T&Cs for protection of Indiana bat would retain existing snag trees and benefit other wildlife. Removal of treetops and limbs (whole tree harvesting) would not be allowed, and only trees marked or designated for harvesting could be removed. Existing dead and downed large woody material (which provides habitat structure and diversity for various wildlife species) would remain on site throughout the proposed harvest units and adjacent forest.

No new road construction and relatively minor amounts of 5.5 miles of pre-haul road maintenance of the existing forest road system and old skid trails are proposed. Roads can cause direct effects to wildlife if they are barriers to travel routes for daily activities, dispersal, and migration. Forest roads and landings that remain open to the public can cause the direct effect of increased human access, which can cause the direct effect of wildlife mortality from road-kill, hunting and trapping, and cause adverse indirect effects on species intolerant of human activity (Deming 1994). BMPs (NHDFL 1997) and road closure S&Gs such as gates, berms, and rock barriers would limit motorized vehicle access within the project area upon completion of harvesting. Although hunting and human access can and should be regulated, it is an issue independent from silvicultural practices. The proposed road pre-haul maintenance and skid trail reuse under Alternative 2 would not create isolated habitat patches or restrict wildlife dispersal necessary for maintaining population viability. The WMNF FEIS analyzed the effects of road construction on wildlife, and Alternative 2 is within the range of effects (USDA-FEIS 1986, IV-27).

Large Mammals (MIS White-tailed deer & MIS Canada lynx (see TEPS section)): The white-tailed deer is a MIS for emphasis under the uneven-aged system in management area 3.1 (USDA-LRMP 1986a,VII-B-21, S&G #31). The availability of quality wintering areas for deer can be a limiting factor in their survival. Spruce-fir or hemlock stands are the basic cover component of most wintering areas. As a minimum, at least 50% of the entire wintering area should be in "functional shelter" at all times. Functional shelter is defined as softwood cover at least 35 feet tall, with at least 70% crown closure (Reay et al. 1990).

Site-specific field reviews determined the Nubble Project Area does not contain a known documented deeryard and the softwood areas within the stands proposed harvesting do not function as a core or primary yard habitat (Forest Service ID-Team; and NHFG review).

Alternative 2 would cause the direct effect of an increase in the amount of limbs and tops on the ground from harvested trees, which would provide a localized, short-term source of natural browse for MIS white-tailed deer when they need it most for overwinter survival. Mobility patterns of large mammals traveling to, from, or within the proposed Nubble Project Area after harvesting activity would not be adversely affected by the proposed clearcut and group selection treatments or any road reconstruction or skid trails. Skid trails and forest roads provide packed snow trails for animals such a bobcat, fisher, and coyote to move along while foraging. Large mammals such as moose and MIS white-tailed deer have large home ranges, and appear to adjust quickly to displacement from harvesting activity and may adjust their foraging behavior from day to night to avoid harvesting activity. Noise from logging equipment may cause a direct effect of displacing MIS white-tailed deer to other areas during the day, but they return at night to feed on down treetops. A moose was observed licking salt from harvesting equipment on an active logging operation on the White Mountain National Forest. On another forest, deer were observed browsing felled tree tops while forest workers continued operating nearby (personnel communication with Frank Hagan 2003). Alternative 2 would meet the Purpose and Need and would help move the forest towards the desired condition for HMUs 110 & 111 and for managing the stands for hardwood regeneration for MIS white-tailed deer forage habitat (USDA-LRMP 1986a, VII-B-21, S&G #33).

Small Mammals (MIS Snowshoe hare and MIS American marten (see TEPS section)): Because of the high reproductive rates of most small mammals, changes in their populations respond quickly. A study found that before and immediately after cutting in a pine forest, the density of the small mammal population was low. However, by the time the second crop of grass and forb seed was on the ground, the small mammal population had peaked and declined slowly through the remainder of the regeneration period (Trousdell 1954 cited in Harlow et al. 1997).

The relatively moderate amount of ground disturbance in terms of magnitude and duration (partially during frozen ground mitigation measure conditions) associated with harvesting approximately 720 treatment acres could temporarily interrupt the established territories and travel patterns of some terrestrial small mammal species with small home ranges such as MIS snowshoe hare, mice, vole, or shrew. Temporarily displaced from their immediate territories by the direct effects of soil or snow compaction or tree removal, these species would most likely occupy immediately adjacent habitat. Once harvesting activity is completed, over time these species or their offspring may return to reestablish their former territories within the harvested units. Furthermore, the WMNF Forest Plan Wildlife standards and guidelines, mitigation measures, and the USFWS BO Terms and Conditions would retain wildlife cavity trees, snags and existing large woody material already on the ground for habitat structure for MIS snowshoe hare and other small mammals.

Alternative 2 could displace individual MIS American marten seasonally from portions of its home range because of increased human presence during harvest activity (assuming the project area is part of a marten's home range). Forest-wide wildlife monitoring data indicates marten are distributed across the northern portion of the WMNF and data suggests their populations are increasing (USDA-FS 2001a).

Upland Game Birds (MIS ruffed grouse): Alternative 2 would have the direct effect of creating open forage habitat suitable for MIS ruffed grouse. The MIS ruffed grouse requires early-successional young age-class, as grouse often nest in regenerating stands created through clearcutting. The dense cover in young stands may afford grouse protection from nest predators. Ruffed grouse nests located in dense shrub growth of 4-year-old clearcuts were found to be least susceptible to predation by crows and blue jays in central Pennsylvania (Yahner and Cypher 1987 in Harlow et al. 1997).

Neotropical Migratory Songbirds & Raptors (MIS Chestnut-sided, mourning, Cape May & pine warbler; Northern junco; Eastern kingbird & bluebird; Northern goshawk & broad-winged hawk): A direct effect of tree removal through clearcutting and group selection treatments may cause displacement from upper canopy habitat of various neotropical bird and hawk species. Alternative suitable upper canopy habitat would be available to these species in the large blocks of mature closed canopy forest within the HMUs 110 & 111 that are not subject to vegetation management. This mature habitat would remain long-term sources of closed-canopy habitat within the HMUs. Although all field reviews detected none, trees that are discovered to contain raptor nests would not be harvested under the action alternatives, and a ¼-acre reserve group of trees would remain around any raptor nest site (NHDFL 1997). No harvesting activity would occur from March 15 through May 20 to avoid conflict with active raptor nests, if present (USDA-LRMP 1986a S&G, III 18 & VII-B-20). The winter harvest mitigation measures proposed under Alternative 2 would avoid the direct effects of disturbance to songbird nests or eggs. The Proposed Action would not have a measurable negative effect on migratory bird populations hence the project complies with the Migratory Bird Treaty Act Executive Order 13186 and MOU. The 1918 MBTA was designed to forestall hunting of migratory birds and the sale of their parts, and was not intended to regulate timber harvesting.

Indirect Effects

Forest roads and landings can cause beneficial indirect effects on various wildlife species by providing a long-term vegetative condition that does not exist in an interior forested environment. A study on the use of log landings by wildlife in the White Mountain National Forest found that landings provide a temporal and spatial extension of the early-successional habitat provided by clearcutting. No observations in the study suggest that negative effects result form the presence of log landings, and observations actually found that landings appear to benefit small mammal species associated with early seral stages and support localized populations after they no longer occur in the adjacent clearcuts. Landings also benefit many bird species by producing fruit and seed sources as forage (Tucker, 1992).

Existing roads and landings would be reused, and no new roads would be built in the Nubble Project Area. All roads would continue with the same road management policies currently being implemented in this area.

Large Mammals (MIS White-tailed deer & Canada lynx (see TEPS section)): Alternative 2 would cause an indirect effect of stimulating the softwood regeneration and growth, and increasing the hardwood browse beneficial to MIS white-tailed deer. Most studies indicate that the first few years after clearcutting, deer and moose foods (succulent stems of woody plants, forbs, and grasses)

increase to their highest level of abundance and availability (Martin et al. 1955, Murphy and Ehrenreich 1965, Crawford et al. 1975, Smeins and Hinton 1987 cited in Harlow et al. 1997). Clearcuts have been found to enhance deer habitat in most regions, even in the snowbelt portions of the north central and northeast states, providing that nearby shelter against cold winter winds is available (Verme 1965, Krefting and Phillips 1970, Newton et al. 1989, Hughes and Fahey 1991 cited in Harlow et al. 1997). The forest openings created by group and clearcutting treatments under Alternative 2 would increase browse for MIS white-tailed deer and moose. These native wildlife species inhabit a wide range of forest types and age classes in the northern hardwood forests. The amount of understory ground vegetation and reserve trees within the harvested stand after treatment, coupled with the surrounding uncut forest, would provide adequate food, shelter, and escape/hiding cover for various wildlife species (Gore 1988, cited in Deming 1994).

Alternative 2 would have the indirect effect of residual hardwood stumps sprouts providing browse for MIS white-tailed deer. Also, there would be an increase of herbaceous and berry producing shrubs in the open areas after harvest treatments beneficial to black bear as forage habitat. Under the Proposed Action, the group selection treatments would benefit black bear habitat. Some individual mast producing beech trees would be cut during harvesting. However, mitigation measures would retain heavily used concentrations of beech trees scarred by foraging black bear (see mitigation measures). A review of stand data (district files) indicates that several northern hardwood stands within the HMUs 110 & 111 contain beech trees with sufficient size to produce beechnut mast. The relevant studies cited above support the reasonable conclusion that the harvest treatments proposed for the Nubble Project Area would produce suitable habitat for moose, black bear, and MIS white-tailed deer.

Small Mammals (MIS Snowshoe hare and MIS American marten (see TEPS section)): Under Alternative 2, Forest Plan Riparian and Wildlife Standards and Guidelines (USDA-LRMP 1986a, III 15-19) would maintain existing and future wildlife cavity and snag trees and downed large woody material located within and immediately adjacent to the proposed harvest units, which would mitigate potential effects of tree removal. Maintaining this habitat diversity is beneficial to MIS snowshoe hare, MIS American marten, small rodents, forest bats, birds, amphibians, reptiles, and invertebrates as potential roost, nesting, or forage habitat (Tubbs et al. 1987). In addition, more than 10% of HMUs 110 & 111 is managed under an extended rotation providing older trees as potential roosting and nesting habitat for forest bats, birds, and small mammals. The adjacent forest and the Pemigewasset Wilderness (located approximately 5 miles south of the project area) would also provide habitat available to MIS snowshoe hare, MIS American marten, forest bat, bird, and small mammal at the landscape level. The potential beneficial indirect effects of increased sunlight for solar warmth in the treated stands and of increased foraging areas in clearcuts and group selections could reduce or off-set any potential direct effects of tree removal on MIS snowshoe hare, MIS American marten, forest bats, birds, or small mammals from summer/fall harvest.

A study of the American marten in northern Maine compared spatial characteristics of residual forest patches and their use by marten in an industrial forest landscape characterized by extensive timber harvesting. The study found that marten are not old-growth or coniferous forest obligates and that once regenerating stands reach 20 to 40 feet in height they are used by marten no differently than older stands (Chapin et al. 1995 cited in Harlow et al. 1997). See Wildlife Report Appendix F for detailed analysis of potential effects to WMNF MIS and state-listed threatened American marten.

A study by Krusic et al. (1996) compared bat activity (primarily little brown bats) among four age classes of northern hardwood and spruce/fir forest stands on the White Mountain National Forest. Bat activity was highest in over-mature hardwood stands and in regenerating stands (0-9 yr old age class) of both forest types. The data indicated a mixture of forest types and age classes, including clearcut and group cut regeneration and over-mature hardwoods help fulfill the summer habitat requirements of forest bats (see Nubble BE/BA in the project file). A recent survey of woodland bats found no Indiana bat on the WMNF or adjacent in the entire state of NH (BCM 2002).

Winter harvesting mitigation measures are proposed for the following Compartment/Stands, which would avoid disturbance to woodland bats because they are not present at that time:

- Compartment 19/Stands: 18, 26, 39, 45, 46, 50, 57, 63, 74, 77, 96.
- Compartment 20/Stands: 2, 11, 15, 23, 41, 44, 66.

The following compartment/stands could be harvested during the Indiana bat non-hibernation season (May 15 through August 30), but only if conditions are dry. These stands could also be harvested during dry fall months outside of the non-hibernation season:

- Compartment 19/Stands: 42, 44, 54, 58, 62, 66, 70, 71, 73, 80, 99.
- Compartment 20/Stands: 12, 18, 20, 21, 24, 26, 32, 35, 67, 75.

These stands contain a minor percent of potential suitable bat habitat on the White Mountain National Forest (see the BE/BA in the project file for detailed analysis of potential effects to Indiana and small-footed bats). The relevant and local studies cited above support the reasonable conclusion that the harvest treatments proposed for the Nubble Project Area would produce suitable habitat for small mammals including small mammal MIS and woodland bats.

Upland Game Birds (MIS ruffed grouse): Under Alternative 2, clearcut harvesting would increase the percentage of early-successional habitat for the MIS ruffed grouse. Gullion (1990) found one-acre clearcuts with good aspen regeneration have provided the highest response/acre cut. By contrast, of 32 clearcuts less than one-acre in size made at the same time, breeding grouse used only five; suggesting one-acre size threshold that must be reached or exceeded before a clearcut would become an acceptable covert for ruffed grouse winter and breeding season use.

Designated landings, skid roads and trails, and Riparian and Fish Habitat Standards and Guidelines (USDA-LRMP 1986a, III 15-16) would protect and maintain habitat important to invertebrates as prey base for MIS grouse and other birds such as the American woodcock.

Neotropical Migratory Songbirds & Raptors (MIS Chestnut-sided, mourning, Cape May & pine warbler; Northern junco; Eastern kingbird & bluebird; Northern goshawk & broad-winged hawk): Alternative 2 would have the indirect effect of increasing open forage areas through the group selection and clearcutting treatments beneficial to MIS songbirds and hawks. Neotropical migratory bird research on the White Mountain National Forest (Costello 1995) indicated that clearcutting provides more opportunity than group selection for bird species that require early-successional habitat to fulfill all or part of their breeding requirements. Clearcut openings were higher in bird species richness, abundance, and diversity than group selection openings. The management indicator species chestnut-sided and mourning warblers were found in clearcuts and were the most abundant species observed in the group selection openings. Veery and eastern wood pewee are typically associated with older forest age classes (DeGraaf and Rudis 1986), and, although not breeding within clearcuts, they flew in and out and appeared to forage on the abundant fruit crops present, suggesting these clearcuts provide valuable foraging areas (Costello 1995).

A study of breeding bird assemblages in managed northern hardwood forests in New England found that during the first growing season after winter harvest, birds that nested in the stand do not return, but other species move in. Two years after cutting, there may be twice as many species, but a few that were present in the first year may no longer inhabit the site. During the third growing season, the number may double again (DeGraaf 1991). As even-aged forests progress through clearcutting to a mature state, each type and age-class supports a unique assemblage of bird species. Neotropical migrant songbird numbers were censused in clearcut stands of a spruce-fir forest in northern Maine, in a northern hardwood forest in Vermont, and in aspen and mixed oak forests of Pennsylvania. All three studies found that each seral stage (clearcuts, pole, and mature stands) was dominated by a characteristic group of birds (Titterington et al. 1979, Thompson and Capen 1988, Yahner 1986 cited in Harlow et al. 1997). These studies concluded that managers could encourage the presence of a variety of bird communities by maintaining a mixture of forested age classes. In New England's hardwood forests, mature even-aged and uneven aged stands were found to support many of the same bird species, but the younger even-aged stands provided habitat for species not found in uneven-aged stands. This study concluded that clearcut harvesting is decidedly beneficial to neotropical migratory songbird populations (DeGraaf 1987 & 1993 cited in Harlow et al. 1997). The relevant and local studies cited above support the reasonable conclusion that the harvest treatments proposed for the Nubble Project Area would produce suitable habitat for Neotropical migratory birds and raptors (including MIS).

Forest Fragmentation and Edge Effect: Alternative 2 would create short-term, localized edge habitat along the boundaries of the units proposed for clearcutting and group selection treatments until the vegetation attained vertical height. Vegetation age-class or type conversion within a heavily forested landscape such as the White Mountain National Forest is usually not considered forest fragmentation.

Forest-interior (edge-avoiding) birds are vulnerable to brood parasitism by the brown headed cowbird and predation by blue jays, raccoons and red squirrels, particularly in forests fragmented with agricultural land with pasture used by cattle. A study by DeGraaf and Angelstam (1993) on depredation on artificial ground and cup nests in even-aged seedling/sapling, pole, and mature stands of northern hardwood forest in the White Mountain National Forest found no increase in the nest predation rate in the early stages of stand growth, nor was rate of predation related to stand area. Another study in the same forest type compared predation rates in large blocks of managed areas vs. remote reserved areas. No differences in nest predation rates were found for either ground or shrub nests between the even-aged clearcut regenerated areas and the reserved forest blocks (DeGraaf 1995).

On the White Mountain National Forest, the first two years of ongoing forest wide bird monitoring detected six cowbirds during point counts within managed, un-managed, and remote areas (Committee of Scientist wording) and during wetland inventories. Conversely, forest interior ovenbirds were found over 90 percent of the point count plots (USDA-FS 1993, Monitoring Report). Recent studies on the White Mountain National Forest show no increase in brown-headed cowbirds (Yamasaki et al. 2000). Based on Breeding Bird Surveys (1966-98), species showing large or significant population declines within the Partners In Flight Physiographic Area 28 (including the WMNF) show declining trends for the brown-headed cowbird (Rosenberg and Hodgman 2000).

Since occurrence of cowbird and elevated predation rates are usually interpreted as an indication of fragmentation of the forest, the results of these studies and White Mountain National Forest bird monitoring suggest that hardwood-dominated forests in northern New England are not fragmented by even-aged management. Ovenbird habitat use and reproductive success were examined in northern New Hampshire to determine the effect of edge in predominately-forested landscapes. The proportion of nests that failed from all causes, including predation, was higher along edges in 1992 but not in 1993. The number of young fledged per female and the proportion of pairs fledging at least one young did not differ between edge and interior in either year. This study concluded that the effects of clearcutting are moderated by the abundance of mature forest cover in the region and by the tendency of ovenbirds to re-nest after initial nest failure (King et al. 1995 cited in Harlow et al. 1997). These local studies suggest that in large forest tracts like the White Mountain National Forest, applying a mix of both methods would cause no adverse effects to Neotropical migrant songbirds.

The clearcut prescriptions with reserve trees for the Nubble Project Area are consistent with the US Fish and Wildlife Service Biological Opinion Terms and Conditions (USDI 2000) with reserve trees, which would afford vertical structural diversity through the retention of scattered pole sized or larger mature trees within the regenerating harvest units. As the regenerating units develop, the residual trees would provide a component of large over-mature trees within each respective unit. Eventually many of them would probably become cavity trees, providing vertical structural diversity available to wildlife for roost or nest habitat for songbirds, small mammals, forest bats, hawks, and woodpeckers.

Alternative 3:

This alternative would treat the similar stands as Alternative 2. However, Alternative 3 would treat several stands via clearcut or patch clearcut that were deferred under Alternative 2 with a total of 918 acres treated and approximately 7.0 miles of pre-haul road maintenance proposed. Winter mitigation measures as described under Alternative 2 would apply.

Direct and Indirect Effects

This alternative would have similar direct and indirect effects on wildlife or their habitat as described under Alternative 2. However, management indicator species that use the regeneration age class of the northern hardwood community type would find a greater amount of this habitat available within the Project Area. The clearcut and larger group openings would provide suitable habitat to these management indicator species and to forest bats foraging in canopy gaps from the clearcut and group selection treatments. Single-tree selection treatments would not initiate softwood regeneration or conversion to this habitat type, but would maintain more mature forest hardwood habitat for MIS broad-winged hawk and the ovenbird.

Alternative 3 would provide more early-successional habitat suitable to the majority of MIS compared to Alternative 2, as approximately 10% of native forest wildlife species use mature or over-mature forest stands (USDA-LRMP 1986a, VII-M-6, IV-43). This alternative would provide greater opportunity for creating early-successional habitat for MIS songbirds, MIS grouse, MIS white-tailed deer, moose, and black bear. Species, such as the MIS chestnut-sided and mourning warblers that nest and feed in clearcuts may use larger group cuts as well. Some species would benefit from the combination of mature and regenerating forest conditions that would be created with clearcut and group selection and single-tree treatments. Alternative 3 has the greater potential to move the forest towards the DFC for diverse early-successional habitat for wildlife needs compared to Alternative 2.

Summary of Potential Effects on the Amount and Quality of Habitat for Management Indicator Species

A recent query of the WMNF Combined Database System generated the approximate total acres of forest type by age class within the forest-wide planning area. The acres of appropriate forest type by age class were combined into the community/community type each MIS represents per Forest Plan Wildlife Strategy (USDA-FS 1986a, VII-V-B- 5-16), resulting in the amount (acres) and quality (age class) of potential suitable habitat available within the forest-wide planning area for each MIS (CDS analysis USDA-FS 2003). Table 19 discloses that the No Action and the action alternatives would affect the amount and quality of habitat differently for management indicator species having probability of occurrence within the Nubble Project Area. Some species

such as the MIS Eastern kingbird and bluebird would benefit from the immediate establishment of open areas and young trees under the action alternatives, while other species such as the MIS Northern goshawk would benefit in the long term through the perpetuation of shade intolerant forest community types such as paper birch. Species that use large areas of mature forest such as the MIS Cape May warbler would benefit from the No Action alternative. All of the other management indicator species are either negligibly affected by or derive benefit from the treatments which utilize even-age management, namely the Alternatives 2 and 3. The effects to wildlife and habitat are within the range of those described in the FEIS (USDA 1986, IV-62).

The analysis of effects to the amount and quality of habitat for WMNF MIS peregrine falcon and Canada lynx are taken from the Nubble BE/BA and disclosed in the TEPS Section of this analysis. The potential effects to the amount and quality of habitat for WMNF MIS American black duck and Eastern brook trout are disclosed in the Aquatics Report. The following WMNF MIS rufous-sided (now Eastern) towhee, grey-cheeked (now Bicknell's) thrush, blackpoll warbler, common loon, osprey, gray squirrel, Sunapee trout, and Robbins' cinquefoil are not shown in Table 19 due to no probability of occurrence in the Project Area based on extirpation and/or non-suitable habitat present (see Appendix F1).

Table 20: Effects on the Amount and Quality of Habitat by Alternative for MIS Having Probability of Occurrence in the Nubble Project Area (per 36 CFR 219.19).

MIS	MA	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Forest Plan)
American Marten Mixed forest. *Varying age class.*	2.1	Perpetuates the lack of age class diversity. Long-term loss of paper birch. Increase in softwood forest type via long-term forest succession.	Increase in age class diversity via a total of 114 CC; 66 Thinning; 416 Single-tree; 124 Group treatment acres. Perpetuates paper birch & potential development of the softwood forest type within the groups.	Greater increase in age class diversity via 305 CC & 24 Patch CC; 106 Thinning; 385 Single-tree; 98 Group. Softwood development in smaller groups as Alt. 2.
Snowshoe Hare Spruce / fir *Regen / young.*	3.1	Perpetuates lack of regen / young age classes as forage. Potential increase in softwood type over the long-term.	Increase in regen / young age classes as forage via 114 CC treatment acres: With potential increase in spruce / fir regen via small groups.	Greater increase in regen / young age classes via 305 CC & 24 Patch CC with some spruce / fir regen via small groups.
Cape May Warbler Spruce / fir. *Mature / over-mature.*	2.1	Maintains mature closed canopy forest conditions. Potential increase in softwood type over the long term.	Conversion of mature closed canopy forest into open canopy and young age class via 114 CC; and 124 group treatment acres, but very little is in the softwood type.	Similar conversion of mature closed canopy forest into open canopy conditions via 305 CC & 24 Patch CC; 98 group treatment acres.
Chestnut-sided Warbler N. hardwood. *Regen / young*	3.1	Perpetuates the lack of openings & regen / young age classes in northern hardwood forest.	Increase in regen / young age class in northern hardwood type and increase in opening habitat via 114 CC; and 124 group treatment acres.	Greater increase in regen / young age classes in hardwood type via 305 CC & 24 Patch CC; & 98 group treatment acres.
Northern Goshawk N. hardwood. *Mature / over-mature.*	2.1	Maintains mature closed canopy forest for nest habitat. Lack of openings & long-term loss of paper birch suitable as songbird / grouse prey base habitat.	Conversion of mature forest with reduced potential nest habitat, via a total of 114 CC; & 124 Group treatment acres. Perpetuates paper birch & increased open forage habitat via the clearcuts & group treatments.	Greater conversion of mature forest into increased open forage habitat via 305 CC; 24 Patch CC; & 98 group treatment acres. Perpetuation of paper birch & increased open forage habitat via clearcuts and group treatments.
Broad-winged Hawk Paper birch. *Mature / over-mature.*	2.1	Maintains mature closed canopy forest condition. Lack of openings for forage habitat & long-term loss of paper birch component.	Conversion of mature forest with reduced nest habitat via 114 CC; & 124 group treatment acres. Increased openings for foraging habitat and perpetuation of paper birch component.	Greater conversions of mature forest and increase in opening habitat acres and perpetuation of paper birch compared to Alternative 2.
Ruffed Grouse Paper birch. *Regen / young*. Aspen. *Mature / over-mature.*	3.1	Perpetuates existing lack of regeneration age classes. Long-term loss of aspen and paper birch components.	Increase in regen / young age class in hardwoods via 114 C; and 124 group treatment acres. Perpetuation of aspen & paper birch via larger CC openings.	Greater increase in regen / young age class via 305 CC; 24 Patch CC: & 98 group treatment acres with greater perpetuation of aspen & paper birch compared to Alt. 2.
White-tailed Deer Hemlock *All ages*	3.1	Perpetuates lack of regen / young age classes as future forage habitat. Maintains hemlock.	Increase in regen / young age classes in hardwoods as forage in openings via 114 CC & 124 group acres. Maintains hemlock.	Greater increase in regen / young age classes via 305 CC; 24 Patch CC; & 98 group treatment acres compared to Alt. 2. Maintains hemlock.
Eastern Kingbird Openings	3.1	Perpetuates existing lack of opening habitat.	Increase in larger openings via 114 CC; & 124 group treatment acres and associated landings.	Greater increase in opening habitat via 305 CC; 24 Patch CC; 98 group treatment acres; & 148 group/single tree acres as Alternative 2.
Eastern Bluebird Openings	3.1	Similar effects as described for Kingbird.	Similar effects as described for Kingbird.	Similar effects as described for Kingbird.

MIS	MA	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Forest Plan)
Mourning Warbler Opening	3.1	Similar effects as described for Kingbird.	Similar effects as described for kingbird.	Similar effects as described for Kingbird.
Northern (dark eyed) Junco Pine *Regen / young*	3.1	Perpetuates lack of regen / young age classes. Potential increase in softwood type over the long term.	Increase in regen / young age classes with potential for some pine regen via 114 CC; and 124 group treatment acres.	Greater increase in regen / young age classes with some pine regen via 305 CC; 24 Patch CC; and 98 group; 148 group/single tree treatment acres compared to Alt. 2.
Pine Warbler Pine *Mature / over-mature*	3.1	Maintains mature closed canopy forest conditions (few pine present). Potential increase in softwood type over long-term.	Similar conversion of mature forest as Cape May Warbler, but very little mature / over-mature pine present. Potential for pine regen in clearcuts and groups.	Similar effects as Cape May Warbler, but very little mature or over-mature pine type is present in the Nubble Project Area.

MIS Population Trends and Viability within the Forest-wide Planning Area:

Based on the potential direct, indirect, and cumulative effects addressed in this Analysis, Table 20 discloses that the No Action alternative would add to a declining amount of early-successional habitat (suitable to a greater number of MIS) within the Nubble Project Area. However, the No Action alternative in the near term **would not adversely affect population trends and viability of WMNF MIS within the forest-wide planning area**. The Proposed Action and the action alternatives would reduce the amount of mature and over-mature habitat (suitable to a lesser number of MIS) and inversely increase the amount of early-successional habitat within the Project Area. However, The Proposed Action and action alternatives **would not adversely affect population trends and viability of WMNF MIS within the forest-wide planning area** (see the WMNF PVA USDA-FS 2001a in the Nubble Project File).

Table 21: Effects To MIS Having Probability Of Occurrence Within The Nubble Project Area, Bethlehem, NH.

MIS HAVING PROBABILITY OF OCCURRENCE IN THE PROJECT AREA	EFFECTS DETERMINATIONS FOR THE NO ACTION	EFFECTS DETERMINATIONS FOR THE ACTION ALTERNATIVES
Northern Junco *Junco hyemalis* **Cape May Warbler** *Dendroica tigrina* **Pine Warbler** *Dendroica pinus* **Mourning Warbler** *Oporornis philadelphia* **Chestnut-sided Warbler** *D. pensylvanica* **Eastern Kingbird** *Tyrannus tyrannus* **Eastern Bluebird** *Sialia sialis* **Ruffed Grouse** *Bonasa umbellus* **Northern Goshawk** *Accipiter gentilis* **Broad-winged Hawk** *Buteo platyperus* **White–tailed Deer** *Odocoileus virginianus* **Snowshoe Hare** *Lepus americanus* **American Marten** *Martes Americana* **Peregrine falcon** *Falco peregrinus anatum* **Canada lynx** *Lynx canadensis* (extirpated)	The No Action alternative would add to the declining amount of early-successional habitat within the Nubble Project Area. Over time, a declining trend of MIS that use this habitat type would occur within the Nubble Project Area. **However, the No Action in the near term would not adversely affect population trends and viability of WMNF MIS within the forest-wide planning area.**	The action alternatives would decrease the amount of mature and over-mature habitat and inversely increase the amount of early-successional habitat by a varying number of acres within the Nubble Project Area. **However, the action alternatives would not adversely affect the population trends and viability of WMNF MIS within the forest-wide planning area.**

See Aquatics Functional Report for effects and viability determinations for MIS **American black duck and Eastern brook trout**.
See Appendix F for complete analysis of effects for MIS **American marten**.
See TEPS Section Table 8 and Nubble BE/BA for further analysis of MIS **Peregrine falcon** and MIS **Canada lynx**.
Although extirpated, Canada lynx is addressed due to potential suitable habitat present within the Nubble Project Area.

3.2.2.4 Cumulative Effects on Terrestrial Wildlife Resources

The home range and habitat needs of wildlife vary by species (DeGraaf et al. 1992). Therefore, the larger MAs 2.1 and 3.1 within HMUs 110 & 111 were used to facilitate evaluation of past, present, and reasonable foreseeable future effects on wildlife resources such as large mammal species with wide home ranges and evaluation of habitat distribution (Vegetation Report). This larger cumulative effects area includes the site-specific Nubble Project Area, which contains the smaller home range of smaller mammals, amphibians, and reptiles. This Functional Report also used the broader landscape and regional analysis scales to assess potential cumulative effects to wildlife habitat distribution and connectivity, and wildlife population trends and viability within the forest-wide planning area (36 CFR 219.19):

- Lynx Assessment Unit 10 analyzed in the Nubble BE/BA (TES and landscape connectivity).
- The Partners In Flight Physiographic Area 28, included the WMNF (Neotropical migratory birds & hawks).
- The New England and White Mountain subsection regional landscape scales (large and small mammals).

Alternative 1 (No Action)

This alternative would add an adverse cumulative effect to the steadily declining trend in early-successional, regeneration-age class of northern hardwoods and aspen/birch community types within the Project Area and at the larger HMU, Forest-wide, and New England regional scales. Because of a decline in early-successional habitat, Neotropical migrant MIS chestnut-sided and mourning warblers and snowshoe hare, and upland opening MIS Eastern kingbird and MIS bluebird that rely on early-successional age class and/or aspen/birch community type would potentially decline within the Nubble Project Area. Overall, wildlife habitat and species biodiversity within the Nubble Project Area would decline (NHFG 1996). At the landscape scale, this alternative would add to the cumulative effects of

a maturing forest, which is steadily increasing over the past several decades across the White Mountain National Forest, as well as across New England forested landscapes (USDA-FS 1993).

Alternatives 2 & 3

Past NEPA decisions involving vegetation management in the same HMUs 110 and 111 since 1986 (Table 1, Appendix C) have not contributed substantially to the age class diversity within the cumulative effects area or nearby due to relatively small amount of acres treated. Also, stands treated in the Hawthone Knob Timber Sale and the clearcut on former Glaizer tract in HMU 110 have grown out of the early-successional stage into the next age class. These areas will no longer provide early-successional habitat for wildlife species that use this habitat. The early-successional age class habitat is declining in HMUs 110 and 111 and on the White Mountain National Forest landscape and New England region over the past several decades (USDA-FS 1993).

The recent EAs completed for the CCC Timber Sale in HMU 111, Twin Pups HMU 110, and the Bickford Timber Sale in HMU 112 and the Five Corners Timber Sale in HMU 111 determined no cumulative effects to wildlife resource from implementation of any of the action alternatives. Recent harvesting within the CCC and Five Corners Project Areas showed no evidence of major erosion, insect infestation, or disease during sale administration monitoring reviews. The stands treated in these sales will soon grow out of the early-successional stage too. Both projects contained a similar mix of wildlife standards and guidelines as described for the Nubble Vegetation Management Project.

Future non-Forest Service actions on private land adjacent to the forest and the HMUs 110 and 111 are not expected to create substantial amounts of large opening or early-successional habitat suitable to wildlife species that use this habitat. No additional Forest Service vegetation management projects are expected within the Nubble Project Area or HMUs 110 & 111 in the reasonably foreseeable future. Any Forest Service non-vegetation management projects within the cumulative effects area would contain a similar mix of wildlife standards and guidelines as described for the Nubble Vegetation Management Project.

Based on relatively minor, localized, and short-term direct and indirect effects to wildlife and/or their habitat from past, recent, and foreseeable future actions, the action alternatives of the Nubble Vegetation Management Project would not add adverse cumulative effects to wildlife resources. The action alternatives to various degrees would have a positive cumulative effect of creating early-successional habitat within the cumulative effects analysis area.

The potential effects on the Wildlife Resources described in this EA are within the range of effects to wildlife resources analyzed in the FEIS for the White Mountain Forest Plan (USDA-FEIS 1986, IV-62).

3.2.2.5 Effects Determinations for Federal & State Listed & Other Wildlife of Concern

Table 21 discloses the effects determinations for Federally-listed TEPS wildlife species and their habitat taken from the Nubble Project BE/BA (see the Project File). In summary, there are no known documented occurrences of TEPS wildlife species within the Nubble Project Area. The potential effects to TEPS wildlife species include similar direct, indirect, cumulative effects previously described for MIS wildlife in this analysis.

The Nubble BE/BA compared the potential site-specific effects from the Nubble Vegetation Management Project to those disclosed in the WMNF Programmatic Biological Assessment (BA) (USDA-FS 1999) of continued implementation of the 1986 WMNF Forest Plan. The Nubble BE/BA determined there would be no additional effects outside those evaluated in the WMNF programmatic BA. The USFWS concurred that the Nubble Vegetation Management Project is consistent with the Reasonable and Prudent Measures and Terms and Conditions of the USFWS BO (USDI-FW, 2000). The Nubble BE/BA also documents compliance with the WMNF TES Forest Plan Amendment (USDA-FS, 2001), which incorporated the Reasonable and Prudent Measures and Terms and Conditions outlined in the U.S Fish and Wildlife Service Biological Opinion (USDI-FW, 2001). The Nubble Vegetation Management Project is unaffected by the recent national lynx lawsuit, in which the U.S. Fish and Wildlife Service was enjoined from concurring on determinations where the project "may affect" the Canada lynx. Because the Nubble BE/BA determination for Canada lynx is "no effect", the judge's ruling is this case does not apply. Appendix F & G (in the project file) discloses the probability of occurrence of State TESSC and other wildlife of concern. These analyses determined there would be no adverse effects to these species from either the No Action or action alternatives.

Cumulative Effects:

The analysis area for assessing potential cumulative effects to TEPS species taken from the Nubble BE/BA included site-specific Nubble Project Area (small mammal home range) and the broader WMNF landscape Lynx Assessment Unit 10. The Partners In Flight Physiographic Area 28, and the New England and White Mountain subsection regional scales were also used to assess cumulative effects to TEPS population viability.

The Nubble BE/BA considered the effects determinations from the BE/BA completed for the

recent Sales mentioned above (located near the Nubble Project Area). The USFWS concurred with the Nubble BE/BA findings of no adverse cumulative effects from past, present, and reasonably foreseeable projects (including the Nubble Vegetation Management Project).

Table 22: Effects Determinations Taken form the Nubble BE/BA.

FEDERAL STATUS	TEPS WITH POTENTIAL OCCURRENCE WITHIN THE PROJECT AREA	NUBBLE BE/BA EFFECTS DETERMINATIONS
Threatened **Threatened**	Bald eagle *(Haliaeetus leucocephalus)* Canada lynx *(Lynx canadensis)* *	**no effect** to the Federally-listed threatened bald eagle or Canada lynx. All alternatives meet the S&Gs outlined in the CLCAS for protecting suitable lynx habitat. ** Although extirpated, the Canada lynx is addressed due to the CLCAS and suitable habitat present.*
Endangered	Indiana bat *(Myotis sodalis)*	**may affect, but are not likely to adversely affect** Federally-listed Endangered Indiana bat. All alternatives meet the T&Cs outlined in the BO (USDI 2000).
R9-SS **R9-SS** **R9-SS** **R9-SS**	Peregrine falcon *(Falco peregrinus anatum)* Eastern small-footed bat *(Myotis leibii)* N. bog lemming *(Synaptomys borealis sp.)* Wood turtle *(Clemmys insculpta)*	**no impact** to peregrine falcon, and **may impact individuals, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species** of Federally-listed R9 Sensitive Eastern small-footed myotis, Northern bog lemming, or wood turtle.

3.2.3 AQUATIC RESOURCES

Forest Plan Management Area Direction:

The desired conditions for aquatic resources in MAs 2.1 and 3.1 land are to provide an array of habitat types and meet Forest Plan S&Gs (USDA-LRMP 1986a, III 15 a-d, 16, 19, 20 as amended, III-48) which allows stocking of indigenous fish species in MAs 2.1, 3.1, and 6.1.

Riparian Management Direction:

Riparian and fish habitat management direction provides for the protection of water quality and stream bank stability and enhancement of floodplain, wetland, and riparian area functioning to support associated biotic communities (USDA-LRMP 1986a, III-15d, 19, as amended). Table 1 describes the White Mountain National Forest Riparian Classification System. The streams within the Nubble Project Area fall within the types 10, 12, 13, 17, 20, and 21, which are characterized as steep gradient, and/or shallowly entrenched and degrading stream channels, which affect channel capacity, bedload transport, and stream bank stability.

Management Indicator Species (MIS)

American black duck (*Anas rubripes*) is a MIS for the wetland and water community type on the WMNF. Forest wide WMNF wildlife monitoring surveys detected black duck during all four years of wetland bird monitoring (1993-1996). Their habitat is available and well distributed in the White Mountain Subsection, yet more limited in mountainous terrain and their population is considered viable on the forest (USDA-FS 2001). The Nubble Project Area contains suitable aquatic habitat along the margins of the North Branch Gale and Little Rivers and at a small (< 5 Acres) inactive beaver complex located at the headwaters of an unnamed intermittent tributary to the Little River.

Eastern brook trout (*Salvelinus fontinalis*) is a MIS for permanent lakes, ponds, and stream community types on the WMNF (USDA-LRMP 1986a, MIS VII-B-9). This trout requires cool continuous flowing water, up and downstream passage, sediment free gravels for spawning and egg incubation, instream hiding cover, and non-turbid water for feeding on macroinvertebrates (USDI 1982). Eastern brook trout use sheltered, downstream sides of boulders or overhanging banks that are out of direct currents (Scarola 1987). In New Hampshire, this trout typically

spawns in areas of groundwater upwelling during late October or early November. Spawning can occur at temperatures ranging from 40 to 50°F (Scarola 1987). Spawning success is reduced as the amount of fine sediments in the water increases. The New Hampshire Fish and Game Department (NHFG) manage this trout as a game species. Eastern brook trout are distributed nationwide and statewide, and wild MIS Eastern brook trout populations in all major watersheds of the White Mountain National Forest are considered viable (USDA FS 2001a). FS stream surveys of Beaver Brook, N.B Gale River and Little Rivers (USDA-FS 1992-94-95) detected Eastern brook trout.

Eastern Brook Trout Stocking: The perennial portions of Beaver Brook (located outside the Nubble Project Area), Haystack Brook, and the North Branch Gale and Little Rivers contain resident MIS Eastern brook trout (USDA-FS 1992-94-95; USDI 1982 & 97, NHFG 1991-2000). Due to the underlying granitic bedrock geology, the overall productivity of the aquatic habitat in the Gale River, Haystack, and Little River sub-watersheds is low, and self-sustaining Eastern brook trout populations are mostly small sized fish (<6"). Therefore, NHFG stocks the South Branch and main stem Gale and Little Rivers with yearling Eastern brook trout to supplement the inherent low productivity of this stream and provide a recreational fishery (NHFG 1991-2000). Beaver Brook (only the intermittent headwater portion is in the Nubble Project Area) and Haystack Brooks do not appear on NHFG stocking records as being stocked with hatchery-reared Eastern brook trout. Stocking regimes indicate these streams most likely would not be stocked in the future. The unnamed ephemeral and intermittent tributaries to Haystack Brook, N.B. Gale and Little Rivers within the Nubble Project Area do not provide suitable spawning or rearing habitat for Eastern brook trout or other fishes, but they provide habitat for various other aquatic/semi-aquatic biota such as amphibians, reptiles and macroinvertebrates.

Atlantic salmon (*Salmo salar*) is not a WMNF MIS, but there is an interagency effort to re-establish a self-sustaining population in the Connecticut River basin. In a final rule, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service determined endangered species status (per the amended Endangered Species Act of 1973) for the Gulf of Maine distinct population segment of Atlantic salmon. The final rule (USDI, 2000a) did not include endangered status for the Central New England population segment due to extirpation status (which includes New Hampshire).

3.2.3.1 Aquatic Resources Affected Environment

The proposed Nubble Project Area is located on moderately sloped terrain ranging approximately 1,360 to 2,400 feet in elevation within the headwater portions of the Gale River, Haystack Brook, and Little River sub-watersheds. The Nubble Project Area includes Haystack Brook and the North Branch Gale and Little Rivers and several of their unnamed intermittent tributaries. Only the intermittent headwater portion of Beaver Brook is located within the Project Area. These aquatic ecosystems eventually drain into and influence the water quality and quantity of downstream aquatic habitat within the main stem Gale and Ammonoosuc Rivers. Collectively, these rivers are part of the Connecticut River basin.

Site-Specific Project Area Aquatic Surveys:

Forest Service Technicians used a basin-wide survey method (Hankin and Reeves 1988) modified for the WMNF streams and documented the condition of aquatic habitat and the adjacent riparian zone of Beaver Brook and the North Branch Gale and Little Rivers associated with the proposed Nubble Project Area (USDA-FS 1992-94-95). Fisheries Biologist Weloth evaluated Haystack Brook in 2002. Also, Forest Service Interdisciplinary Team (Stand Exam and ID-Team 1997-2003) conducted site-specific field surveys during various times of the year which documented that the proposed Nubble Project Area does not contain unique aquatic habitat such as USGS mapped wetlands, bog meadows, or vernal pools meeting state documentation guidelines (NHFG 1997). There is a small (<5 acres) inactive beaver complex located at the headwaters of an unnamed intermittent tributary to the Little River.

The riparian habitat within the proposed Nubble Project Area contains a northern hardwood and mixedwood forest type primarily of sugar maple and yellow birch and scattered hemlock and white pine. The dominant understory vegetation is hardwood saplings and associated common

ground flora (see Vegetation Report). The existing riparian vegetation functions to retard sediment delivery into stream courses, maintain stream bank stability, and provide streamside shade to maintain cooler summer instream water temperatures for fish habitat in perennial portions of Beaver and Haystack Brooks and North Branch Gale and Little Rivers. The riparian area also provides leaf matter and wood debris recruitment to the forest floor as suitable amphibian and reptile habitat. The riparian vegetation provides approximately 75% of the food base via organic matter such as fruits, twigs, and leaves. This vegetation functions as an energy source (allochthonous) for the food chain in the aquatic ecosystems within the Nubble Project Area.

In summary, the riparian integrity, water quality, and substrate quality indicators measured in streams located within the Nubble Project Area during site-specific surveys, met the WMNF Fish Habitat Standards and Guidelines for MIS Eastern brook trout and Atlantic salmon (USDA-LRMP 1986a, III-15a, b, as amended 11/06/89). No natural catastrophic events or human caused developments occurred since these surveys to substantially alter these habitat indicators.

Amphibian and Reptile Habitat

The aquatic habitat associated with the proposed Nubble Project Area supports aquatic and semi-aquatic biota such as amphibians and reptiles and likely the full suit of coldwater macroinvertebrates. The 12 species of salamanders and 10 species of frogs that occur in New Hampshire have extensive ranges outside of the state (NHFG 1996). There are seven species of turtles, one of which (box turtle) may be an introduction since no evidence of breeding has been reported. Wood and snapping turtles are found statewide, while painted turtles find the northern limit of their range in the White Mountain subsection and the common musk turtle are mostly absent from that area which includes the Nubble Project Area. The Blanding's and spotted turtle are dependant on marshy wetlands and are found primarily in the Gulf of Maine Costal Plain. Thus, the box, musk, Blanding's and spotted turtles are assumed absent from the Nubble Project Area due to lack of suitable habitat and no known documented occurrence due to the project area located outside of their known range.

Federal Listed; Eastern Region 9 Sensitive; State-Listed & Other Aquatic Species Of Concern

Beaver and Haystack Brooks and North Branch Gale and Little Rivers and their associated riparian zones and the small Little River tributary beaver complex provide suitable habitat for the Eastern Region 9-listed Sensitive reptile species wood turtle *(Clemmys insculpta)*. Also, the aquatic portions of the project area provides suitable habitat for the State-listed species-of-special-concern Jefferson salamander *(Ambystoma jeffersonianum)*. However, there are no known documented occurrences of Federal or State-listed amphibians or reptiles or other aquatic or semi aquatic species of concern for the WMNF within the proposed Nubble Project Area (NHFG 1996, Taylor 1993). No aquatic species were detected during stream / riparian survey (USDA-FS 1992, 94, 95) or FS interdisciplinary team field reviews. See the Wildlife Specialist's Report in project file for detailed analysis of state-listed amphibians and reptiles.

3.2.3.2 Aquatic Resources - Related Mitigation Measures

- Large coarse woody material on the ground in the riparian area and outside of harvest units shall be left in place for amphibian and reptile habitat.
- Designate major skid trails and minimize the number of stream crossings.
- Winter harvesting where feasible.

3.2.3.3 Direct and Indirect Effects on Aquatic Resources

This analysis used the habitat indicators of **riparian integrity**, **water quality** and **substrate quality** (Table 5 in Aquatic Functional Report) to determine the potential direct, indirect, and cumulative effects of the No Action and action alternatives on the amount and quality of aquatic habitat for MIS Eastern brook trout and MIS American black duck per (36 CFR 219.19).

Potential Direct and Indirect Effects on Riparian and Aquatic Resources:

In general, direct effects from vegetation management on aquatic species and habitat can include immediate changes in the water quality parameters of turbidity and instream temperatures. Turbidity caused by suspended fine sediment from surface erosion entering stream courses can clog breathing gills and intake feeding structures in fish and aquatic insects. Turbid water can decrease a trout's ability to visually locate food and mates by sight. Turbidity can force resident fish out of their immediate territories until the water clears. An indirect effect of turbidity is sedimentation, which can affect fish populations long-term. For example, the aquatic organisms upon which fish feed can be eliminated from their substrate habitat by scouring sediment, eventually affecting fish distributions and growth, especially the fry stage. Heavy sedimentation of the interstitial spaces of gravel and cobble substrate can smother bottom-dwelling insects and eggs and fry of gravel nesting fish such as trout.

Removal of riparian vegetation providing streamside shade can increase instream temperatures thereby affecting fish populations long-term. Loss of streamside shade can cause warmer instream temperatures thereby decreasing the amount of dissolved oxygen available in the water. Warmer instream temperatures increase a trout's demand for dissolved oxygen, hence affecting fish and aquatic biota survivorship.

Vegetation management can cause similar effects to amphibian and reptile habitat via water quality and quantity as described above, and can affect terrestrial habitat such as travel impediments or increased forest floor temperatures from solar penetration.

Alternative 1 - No Action

No road reconstruction, skid road, or landing construction or reuse and no tree removal associated with vegetation management would occur at this time within the project area.

Riparian Integrity: This alternative would cause no direct or indirect effects on the existing condition of the stream banks or potential for woody material recruitment into Beaver and Haystack Brooks and North Branch Gale and Little Rivers. However, there would be a lost opportunity to increase the amount of open forest canopy for light an solar warmth to the forest floor and increase the amount of early-successional habitat. These microclimate features and seral stage are important to some invertebrate species, which are prey base for many wildlife species including aquatic and semi aquatic amphibian and reptile (Litvaitis et al. 1999).

Water Quality: There would be no potential for point or non-point chemicals such as gas, oil, grease, or sediment generated or transported from vegetation management activities into stream courses. Thus no direct or indirect affects to terrestrial and instream amphibian, reptile, or fish habitat parameters such instream temperatures or turbidity.

Substrate Quality: There would be no potential for sediment generated or transported into streams, thus no direct or indirect effects of sedimentation affecting instream substrate quality (cobble embeddedness).

Essential Fish Habitat For Atlantic Salmon and MIS Eastern Brook Trout and American Black Duck: There would be no reduction in the overall condition of the riparian integrity/stream bank stability or water and substrate quality in the Gale

River, Haystack Brook, or Little River sub-watersheds from the No Action. Therefore, Alternative 1 would not adversely affect existing larvae (fry) and juvenile rearing essential fish habitat for Atlantic salmon. Alternative 1 would not adversely affect MIS Eastern brook trout or American black duck or their suitable habitat within the Nubble Project Area. Therefore, Alternative 1 would not affect aquatic MIS population trends or viability within the Forest-wide planning area or other aquatic species.

Alternative 2 - Proposed Action

Direct and Indirect Effects

There would be a very low potential for minor, localized and short-term direct and indirect effects to portions of Beaver Brook, North Branch Gale River, Haystack Brook and Little River and their unnamed intermittent "feeder" tributaries in the Nubble Project Area.

Riparian Integrity: Riparian and Fish Habitat Standards and Guidelines (USDA-LRMP 1986a, III 15-16) call for maintaining 50% of the basal area within 50 feet of perennial streams, and for retention of large over-mature trees for woody debris recruitment into upper perennial and transition streams such as the North Branch Gale River, Haystack Brook and Little River. Alternative 2 proposes maintaining a 50-foot buffer adjacent to perennial streams. A direct effect of these riparian buffers would retard potential chemicals and sediment, help maintain existing instream water temperatures, protect stream banks. An indirect effect over time would be future terrestrial and instream woody material recruitment (nutrient loading) into the aquatic ecosystems associated with the Nubble Project Area. The standards and guidelines would protect the integrity of the riparian area and stream bank stability within the Nubble Project Area for amphibians and reptiles and MIS American black duck.

Amphibian and Reptile Habitat: (see the Nubble BE/BA in project file for detailed analysis of potential effects to the wood turtle and Appendix F for the Jefferson salamander). One of the most important factors affecting amphibian abundance appears to be forest litter depth, particularly in eastern hardwood forests (DeGraaf and Rudis 1990 cited in Harlow et al. 1997). Riparian and Fish Habitat Standards and Guidelines (USDA-LRMP 1986a, III 15-16) would maintain the potential for accumulation of leaf matter and woody material recruitment to the forest floor available as suitable habitat for amphibians and reptiles. The trees remaining between harvested areas and logging slash left on the ground would help mitigate the direct effects of tree removal by providing a layer of ground cover for shade and areas of accumulated leaf litter and create cooler micro-sites. Also designated landings and skid trails, and winter harvest that minimize soil compaction and leaf litter disruption might shorten the length of recovery time for amphibian species associated with a particular microhabitat (deMaynaidier and Hunter 1995 cited in Harlow et al. 1997). Even though there would be direct effect of a declined amount of habitat available to salamanders and reptiles within the harvest units of the project area, salamanders still may exist in high numbers in adjacent, mature, second-growth stands, especially at the landscape level in the designated wilderness areas on the WMNF thereby maintaining overall biodiversity (NHFG 1996). Salamanders are small and easily overlooked, but their biomass (total weight) per unit area can exceed that of breeding birds in New Hampshire forests (Burton and Likens 1975).

Gibbs (1998) found that simple linear landscape structures such as roads and ditches might represent physical barriers for amphibian migration routes. Indirect effects of obstacles may impede amphibians from traveling to breeding and foraging areas. However, the proposed road and skid trail reconstruction and temporary culverts or skidder bridge crossings on intermittent or perennial channels would not pose travel barriers to spring or fall migration of obligate species utterly dependent upon wetland or vernal pool habitat for their survival such as the wood frog and the Jefferson salamander (undocumented in project area). Furthermore, no vernal pools were found during FS interdisciplinary team and site-specific field reviews. Wet areas such as the small Little River beaver complex are routinely avoided and excluded from proposed harvest units.

Water Quality: Using log landings and skidding associated with harvesting has the potential to generate/deliver sediment into streams at crossings. Suspended sediment in the water column could cause localized turbidity and potential displacement of resident fishes and other aquatic species. The proposed temporary pipe culverts and skidder bridges located at designated stream crossings within the proposed Nubble Project Area (used successfully elsewhere across the forest per Sale Administrator Review Reports) would insure additional protection of water quality (turbidity and instream temperatures). Best Management Practices (BMPs) would protect the water quality for amphibian, reptile and MIS Eastern brook trout and American black duck habitat within the aquatic ecosystems.

Substrate Quality: There would be no new road construction and the minor pre-haul maintenance of the existing Forest Service Road System already in place has low potential for minor sediment delivery into mostly the non-fish bearing intermittent streams. The potential amount of sediment generated and delivered into the intermittent, headwater streams affecting substrate quality causing cobble embeddedness within the Nubble Project Area during harvesting would be minimal because State BMPs such as winter harvesting and compliance with LRMP S&Gs would minimize soil disturbances. If transported and settled out, sedimentation could affect downstream fish habitat, such as MIS Eastern

brook trout spawning and rearing areas identified during site-specific stream surveys of Beaver Brook, North Branch Gale and Little Rivers (USDA 1992, 94, 95) and Haystack Brook (Weloth 2002). Bridge construction and stream crossings on high value fisheries streams would not occur during October and April to avoid egg loss due to possible sedimentation (USDA-LRMP 1986a, VII-B-20). These BMPs include designated skid trails with erosion control at landings, crossings and haul routes. Young of the year MIS brook trout fry may use an active intermittent stream to escape predation or adults may use the lower reaches for spawning. The headwater portions of the intermittent streams within the proposed Nubble Project Area do not provide suitable fish habitat directly. Fish passage through temporary pipe culverts on intermittent channels or under a skidder bridge would not pose a migration barrier to fishes including MIS Eastern brook trout documented in the perennial systems during the stream survey (USDA 1992, 94, 95, 2002).

Alternative 3

Direct and Indirect Effects:

Similar minor, localized, and short-term direct and indirect effects to amphibian, reptile, and fish habitat including MIS Eastern brook trout as related to riparian integrity, water quality, and substrate quality, and travel impediments and displacement as described under Alternative 2 would occur. Similar effects would occur because similar stands, access roads, and similar amounts of skid trails and new log landings are proposed under Alternative 3. However, the magnitude of direct and indirect effects to amphibian, reptile, and fish habitat including MIS Eastern brook trout and American black duck from Alternative 3 has the potential to be slightly more than the Proposed Action because a greater total of stand acres would be treated and/or a greater amount of clearcutting is proposed and more timber volume would be skidded along the trails. Because implementation of BMPs, Fish Habitat & Riparian S&Gs, and winter logging mitigation measures described under the Proposed Action would apply to Alternative 3, they would minimize potential sediment delivery into stream courses during harvest. The direct and indirect effects of these alternatives on MIS Eastern brook trout and MIS American black duck would not be substantial in terms of duration and magnitude.

Alternative Summary

The potential direct and indirect effects to riparian, amphibian, reptile, and fish habitat described under the No Action, Proposed Action and Alternative 3 are within the range of effects analyzed in the FEIS under the section relating "Effects Of Timber Management Activities On Other Benefits and Resources-Soil and Water" (USDA-FEIS 1986, IV-30, Item 9a.1). Implementation of the Proposed Action or Alternative 3 would cause localized, minor to no adverse direct or indirect effects on the condition of the ephemeral or intermittent channels, the riparian areas, or perennial fish habitat within and downstream of the proposed Nubble Project Area. However, the Proposed Action or Alternative 3 **would not adversely affect existing larvae (fry) and juvenile rearing essential fish habitat for Atlantic salmon.** All of the action alternatives **would not adversely affect MIS Eastern brook trout or American black duck or their suitable habitat within the Nubble Project Area. Therefore, Alternative 2 or 3 would not affect aquatic MIS population trends or viability, or other aquatic or semi aquatic species of concern or their habitats within the Forest-wide planning area.**

The action alternatives would incorporate Best Management Practices and Forest Plan Riparian and Fish Habitat S&Gs for protection and maintenance of Atlantic salmon and MIS Eastern brook trout and MIS American black duck and their habitats. Fish Habitat and Riparian S&Gs call for maintaining 50% of the basal area along perennial brooks (USDA-LRMP 1986a, III-15-16). Installation of erosion control water bars, ditching techniques on landings and skid trails, or temporary stream crossings would limit sediment delivery and help maintain suitable instream temperatures and allow for future woody material recruitment into the stream courses thereby maintaining aquatic habitat diversity within the Nubble Project Area. Furthermore, the proposed Nubble Project Area is located on moderately sloped terrain with ample amounts of ground cover vegetation. Harvesting activity is proposed mostly during firm or frozen winter ground conditions, thereby limiting the potential for soil transport into the stream courses. Stream crossings would insure fish passage and would not pose a barrier to spring or fall migration of amphibian species. No new road construction and minor amounts of road maintenance of existing forest road is proposed. Road and soil mitigation measures designed to minimize soil and slope disturbances, would prevent sedimentation of cobble substrate within and downstream from the Nubble Project Area.

3.2.3.4 Cumulative Effects on Aquatic Resources

The analysis area for cumulative effects to aquatic resources included the Nubble Project Area and the larger Gale River, Haystack Brook and Little River sub-watersheds.

Alternative 1 (No Action):

Because there would be no direct or indirect effects from implementation of the No Action, the No Action would not add adverse cumulative effects to the existing condition of the ephemeral, intermittent, or perennial streams and riparian or fish habitat for Atlantic salmon or MIS Eastern brook trout or MIS American black duck. However, the No Action would add an adverse cumulative effect to adjacent terrestrial habitat due to the lost opportunities to increase the amount of open forest canopy for light and solar warmth to reach the forest floor and to increase the amount of early-successional habitat. These light and thermal microclimate features and the habitat seral stage are important to some terrestrial and aquatic invertebrate insect species who use early-successional plant hosts for food (see Wildlife Functional Report in the Nubble Project File).

In turn, these invertebrates become prey base for many wildlife species including cold blooded amphibian and reptiles, which also use these open canopy areas in forested habitat to gain solar warmth (Litvaitis et al. 1999).

Alternatives 2 and 3 - Aquatic Species and Riparian Habitat

Historical logging practices affected instream habitat conditions in New Hampshire (Taylor et al. 1996). The stream inventories conducted across the WMNF indicate that most streams have suitable instream habitat needed by trout including coldwater temperatures and good hiding cover. However, surveys indicate a lack of habitat diversity with the percentage of pools below the recommended guideline (USDA-FS 1986a). The action alternatives should not have any substantial effect on current instream habitat conditions because maintaining large trees adjacent to streams would allow for recruitment of large woody material into these streams. Large wood recruitment may increase the amount of pool habitat in these systems in the future since (Likens and Bilby 1982).

The cumulative effects on amphibian, reptile, and fish habitat from implementation of the Proposed Action or Alternative 3 are expected to be none, since a relatively moderate percentage of the overall Gale River, Haystack Brook and Little river sub-watersheds in HMUs 110 and 111 would be treated and soil erosion mitigation measures would be implemented. Furthermore, there was no evidence of active erosion on old skid trails or landings (which have revegetated) noted during site-specific interdisciplinary team field reviews of the proposed project area from past management activities. Existing roads, landings, and skid trails are stable and, unless they have a gravel surface, are revegetated. Nearby areas harvested during the 1980's have revegetated into saplings approximately 10 to 15 feet high or greater. See the Water Quality and Recreation Sections for effects from existing dispersed campsites within a portion of the Haystack Brook riparian area.

The EAs completed for the nearby Bickford, CCC, and Five Corners Vegetation Management Projects determined low potential for minor direct and indirect, to no cumulative effects to aquatic species or their habitat within the Gale River subwatershed. There are no foreseeable future vegetation management activities proposed within the Gale River, Haystack Brook and Little River subwatersheds. Other management actions would adhere to similar Forest Plan Standards and Guidelines and best management practices for erosion control as planned for the proposed Nubble Vegetation Management project.

Past harvesting in the Gale River subwatershed included the Scarface Brook Sale completed between 1983 and 1987, which included 2.7 miles of road construction or reconstruction and the harvest of 4 MMBF of timber via 138 acres of clearcutting during summer, fall and winter. The Forest Service monitored water quality in Scarface Brook one year prior to any harvest activity and for one year after harvesting concluded. A continuous water sampler extracted water from the brook at 90-minute intervals throughout the test period. The only unusually high turbidity readings occurred during and after a period of heavy rains prior to the inception of harvest operations. Throughout the time of harvest and for the subsequent year, the water quality in Scarface Brook met NH Class A Standards. Based on the results of past activities such as the Sacrface Timber Sale, there is every reason to believe that water quality would be well protected in reasonable foreseeable future vegetation management projects.

The Proposed Action and Alternative 3 would adhere to Forest Plan Standards and Guidelines for protecting and maintaining fish and riparian habitat and **would not cause adverse cumulative effects to Essential Fish Habitat for Atlantic salmon.** The Proposed Action and Alternative 3 **would not cause adverse cumulative effects to MIS Eastern brook trout or American black duck habitat or their trends or population viability within the forest-wide planning area**, or other aquatic species of concern. The potential effects to amphibian, reptile, fish and riparian habitat described in this analysis are within the scope and range of effects described in the White Mountain National Forest FEIS (USDA 1986, IV-30, Item 9a. 1) under the section relating Effects Of Timber Management Activities On Other Benefits and Resources - Soil and Water.

3.2.4 BIOLOGICAL DIVERSITY

Biological Diversity (biodiversity) is commonly defined as the variety of life and its processes occurring at various levels. The diversity of species, communities, and genetic variability is ensured by the presence of varying conditions within a region (NHFG 1996, CEQ 1993). The biodiversity concept embraces both the components of an ecosystem and the processes that bind the components together. Assessments of biodiversity can include multiple scales such as genetic, species, population, community, ecosystem, landscape or regional:

Alpha diversity is the number of species at the habitat or community level.

Beta diversity is change in species composition along environmental gradients (elevation, soil moisture & fertility).

Gamma diversity is many habitats and environmental gradients in a geographic region.

3.2.4.1 Biological Diversity Affected Environment

Gama diversity: At the New England geographic region level, this analysis used information on biological diversity from, "New Hampshire's

Living Legacy: The Biodiversity of the Granite State, (NHFG 1996)", and "New England Wildlife Habitat; Natural History, and Distribution (DeGraaf et al. 2001) and "Biodiversity in the Forests of Maine (UNH 1999). The distribution of vegetative community types and age classes, and the structure of vegetation determine the number of different wildlife species (species diversity) that occur on a landscape (DeGraaf et al. 1992). Special habitat features such as upland openings, wetlands, vernal pools, cavity trees, downed course woody material, and riparian zones add to habitat diversity. The following table displays the various levels of biodiversity and the approximate number of associated wildlife species.

Table 23: Levels of Biodiversity and the Approximate Number of Associated Wildlife Species.

Biodiversity Level	Approximate Number Of Wildlife Species	% Species Associated With Regeneration / Young Age Class	% Species Associated With Mature / Over mature Age Class
New England Geographic Region	Approximately 339 inland wildlife species inhabit New England [a].	257 species have a primary or secondary association with woody vegetation. Of the 257, approx. 233 (90%) have a primary or secondary association with regenerating or young age class among all of the forest types[a].	The remaining 10% have a primary or secondary association with mature, over-mature, or old growth forest habitat types [a].
White Mountain National Forest Landscape	31 species of reptiles and amphibians; 190 species of birds; and 56 species of mammals inhabit the White Mountain National Forest throughout all or part of the year [b].	These species use a variety of habitat types & age classes to meet their needs Approx 66% use early-successional forest habitat for all or part of their life cycle. More than ½ of the birds on the White Mountain National Forest are Neotropical migratory songbirds (breed in US & winter south of US), and approx. 85% use early-successional habitat for all or part of their life cycle [b].	On the White Mountain National Forest there is abundant available habitat for those species that use mature or over-mature habitats [a].

[a] USDA-FS. 1986a. White Mountain National Forest LRMP, VII-B-1. [b] DeGraaf and Rudis 1986; DeGraaf et al. 1992.

Existing Condition of Biological Diversity:

Habitat Diversity (Mature / Over-mature; Wetland; Upland Opening; and Early-successional)

At the WMNF landscape level, there is more available habitat for species using mature and over-mature habitats, and a proportionally lesser amount of available habitat for species that use regenerating or young age class habitat (USDA-FS, LRMP 1986a, VII-B-2; USDA-FS CDS 2003). There is disproportionately a lower percentage of early-successional habitats compared to the mature-over-mature habitat within the Nubble Project Area.

***Alpha* diversity:** At the stand level (Nubble Project Area) analysis of the HMUs 110 and 111 discloses that the age class compositions of the vegetation communities present are dominated by mature/over-mature northern hardwood forest. There is approximately 3% non-forested habitat (upland opening and wetland) within the Nubble Project Area. Upland and wetland non-forest types provide basic habitats for distinct groups of species and seasonally important habitat elements for species that also use forest, such as MIS ruffed grouse and wild turkey, and early spring forage for MIS white-tailed deer. The presence of upland and wetland non-forested habitats is necessary for approximately 22 % of the wildlife species found in New England and seasonally important to another 70 % of the region's species (DeGraaf et al. 1992).

***Beta* diversity:** The White Mountain Subsection (includes the WMNF) is divided into 4 Land-type Associations (LTAs): Valley Bottom, Mountain Slope, Upper Mountain Slope, and Mountaintop. LTAs are broad categories of land capability that reflect differences in geomorphology, elevation gradients, and climax forest composition. The distribution of habitat communities on the WMNF is the result of land capabilities and past management practices and natural disturbances.

The Nubble Project Area contains primarily northern hardwood forest on lower Mountain Slopes LTA, which includes Ecological Land Types (ELT 115c, 115g, and 105) and a small amount of northern hardwood-spruce-paper birch forest at the interface of the Mountain Slope and Valley Bottom LTA (ELT 115a). The natural disturbance pattern for the Valley Bottom LTA is mainly caused by wind, which includes a combination of stand-damaging events (i.e. broken tops, small areas of blow-down), and stand-replacing events (all trees blown down in a large enough area recognized as a stand with a new regenerating forest). Based on data from the Northeast, it is estimated that stand-replacing natural disturbance might place 3% to 6% of the landscape in the Valley Bottom LTA in seedling or sapling conditions. The Mountain Slope LTA is least likely to endure large catastrophic natural disturbances, although such disturbances do occur. Estimates for the Northeast range 1% to 3% of the northern hardwood forest in the Mountain Slope LTA may be in the 0-15 year-old seedling or sapling states at any one time because of natural disturbance. Experience indicates the normal occurrence of natural disturbance in northern hardwood forests being small scale, frequent, and most common on shallow or poorly drained soils (i.e. individual or small groups of trees blowing down). Small-scale disturbances tend to perpetuate the normal sequence of succession, i.e. shade-tolerant species dominating and eventually replacing those that are shade-intolerant. The likelihood of paper birch / aspen stands being reproduced is minimal and reduces the diversity of habitats across the landscape.

Some mid- to large-size natural disturbances do occur in the Northeast, but they are much less infrequent, sporadic, and unpredictable. The ELTs that are wet or shallow to ledge indicate a risk to large-scale windthrow. These ELTs tend to be high elevation or lowland softwood areas. Current FS compartment records and site-specific field reviews indicate only scattered pockets of blow-down occur

within the Nubble Project Area (LTA and ELT maps located in the project file). Major hurricanes and windstorms occurred 4 to 5 times during the 20th century. The last severe fire period was during the late 1940s and early 50s. Although wind has a dramatic effect on forest overstories, it has little impact upon successional trends and overall species composition.

1998 Ice Storm Event: Field reviews and over-flights of the WMNF documented that the ice storm affected mostly the hardwood forest type in other parts of the Forest (Kilkenny Range) located outside of the Nubble Project Area. Thus, the 1998 ice storm did not create any natural openings or early-successional habitat within the project area (Forest Service field reviews), and wildlife habitat and populations within the Nubble Project Area were not affected by this natural storm event.

3.2.4.2 Environmental Consequences

Potential Direct and Indirect Effects to Biological Diversity:

In general, vegetation management directly affects aquatic and terrestrial wildlife habitat which, depending on the prescription, scale, intensity, or duration, can have positive, negative, or neutral effects to biological diversity (biodiversity). Positive effects can result in protection, maintenance, or promotion of biodiversity, and negative effects can interrupt function or processes and reduce biodiversity. Neutral effects arise when an action affects some species positively yet affects others negatively, or tend to mimic natural events or processes characteristic of the region or area (i.e. drought, flood, wind-throw, hydrologic regimes, nutrient loading).

This analysis incorporates the following key principles in analyzing the potential effects to biodiversity as outlined in the document entitled, *"Incorporating Biodiversity Considerations into Environmental Impact Analyses under the National Environmental Policy Act"* (CEQ 1993):

Ecosystem Approach:

The Wildlife Section incorporates by reference *"The Biodiversity of the Granite State (NHFG 1996)",* which examined biodiversity across the entire statewide landscape and ecological subsections. This analysis uses varying ecosystem scales appropriate for analyzing potential direct, indirect, and cumulative effects to each resource considered.

- The Soils Section uses the forest-wide ecological land type classification system (ELT) for managing the terrestrial landscape of the Forest as described in the 1986 WMNF Forest Plan. The Nubble Vegetation Management project incorporates the ELTs that describe geomorphic history, climax forest, parent material and vegetation associations based on land capability of forested ecosystems.
- The Cultural Resource and Vegetation Sections reviewed the influence of past European settlements and logging history on the current condition of the landscape and vegetation and wildlife resources on the forest (land clearing and over hunting).
- The Recreation and Community/ Economic Sections address current human factors as part of the ecosystem.
- The Vegetation and Wildlife Sections assessed the status and trends of vegetative communities (HMU 110 & 111 Analysis) and used the WMNF Forest Plan MIS framework to represent a diversity of habitats well distributed across the ecosystem landscape over time (per 36 CFR 219.19).

Protect Communities and Ecosystems:

- This analysis incorporates by reference the appropriate WMNF LRMP Desired Future Conditions and Standards and Guidelines that protect natural communities, special terrestrial habitat features, aquatic ecosystems, and native species and cites Mitigation Measures to avoid introduction of invasive non-native species. All natural communities and ELTs currently present within the Nubble Project Area would continue to exist in approximately the same amounts and distribution.

Minimize Fragmentation and Promote Natural Pattern and Connectivity Of Habitats:

- The Wildlife Section cites the WMNF Monitoring Reports (that summarize the WMNF Wildlife Monitoring Data) and local research studies, which indicate fragmentation is not occurring based on few cowbirds present on the WMNF.
- The Nubble Project Area would maintain a forested landscape with no conversion of National Forest land into permanent agriculture or non-forest development (i.e. shopping mall). There is no private land within the immediate Nubble Project Area. There is private land adjacent the project area including the towns of Bethlehem and Twin Mountain where development is concentrated and contained.
- The Transportation Section explains that the road system is in place, which includes gravel and forest woods roads, and no new roads would be built. The Wildlife Section determined road reconstruction within the Nubble Project Area would cause no adverse effects on fragmentation, natural patterns of wildlife mobility, or habitat connectivity.
- The TEPS Section summarizes the BE/BA determinations from the Lynx Assessment Unit 10 that ensure thresholds for landscape linkages and connectivity of habitats are maintained. The clearcut units proposed for the Nubble Project Area would be separated by a managed stand of at least 10 acres (LRMP S&G, III-17).

Promote Native Species and Avoid Introducing Non-native Species:

The Vegetation and Wildlife Sections describe the native plant, tree, and wildlife communities within the Nubble Project Area. Despite the occurrence of invasive plants such as Japanese knotweed and purple loosestrife on portions of the forest, recent forest-wide surveys for noxious invasive plants documented that the WMNF as a whole does not have an invasive plant problem (NEWFS 2002). Non-native plant species are used on private lands and roadsides adjacent to and outside of the immediate Nubble Project Area. The Proposed Action and action alternatives do not include specific actions that would purposely introduce non-native plant or wildlife species within the Nubble Project Area. All actions would be consistent with the 1999 Invasive Species Executive Order 13112 and standards and guidelines in the Weed Prevention Practices Guide to prevent noxious weeds.

Protect Rare and Ecologically Important Species:

Site-specific field surveys in suitable habitat of the Nubble Project Area documented no occurrence of R9-listed Sensitive Species. Buffers would be added for protection measures with monitoring conducted if found. The Nubble Project BE/BA determined that the Proposed Action and all alternatives may impact individuals, but would not cause a trend toward federal listing for R9-listed sensitive species and no effect to Federal listed T&E species for the Nubble Project Area. Also, State-listed and other species of concern would not be adversely affected by any of the action alternatives.

Maintain Unique or Sensitive Environments:

The NHNHI conducted a site-specific survey of the Nubble summit rock outcrop located outside the Project Area and outside of any proposed harvest activity. NHNHI documented

no other findings of unique, sensitive environments, or exemplary communities such as old growth stands, mapped alpine bogs, ravines, meadows, high cliffs, rock talus slopes, vernal pools or caves. The action alternatives would implement Forest Plan S&Gs and Mitigation Measures that avoid and protect any such areas and buffers would protect the small inactive beaver complex located in the tributary to the Little River.

Maintain or Mimic Natural Ecosystem Processes and Naturally Occurring Structural Diversity:

The Proposed Action and all alternatives would not interrupt the natural processes (i.e. windthrow, ice storm, drought, disease, etc.) characteristic of the region. The Forest Plan Wildlife Standards and Guidelines and the USFWS BO Terms and Conditions for Indiana bat would maintain naturally occurring snag structural diversity. The Nubble mitigation measures would maintain large woody material as naturally occurring structural diversity on the forest floor.

Protect Genetic Diversity:

All alternatives would allow processes for genetic interaction (such as movement and seed dispersal) for animals and plants to occur. The action alternatives would provide a range of successional stages of vegetation, protect unique habitats, and discourage non-native species. By maintaining successional stages and unique habitats, genetic variations/ diversity and the ability to adapt are also maintained.

Alternative 1 - No Action

Potential Direct and Indirect Effects

Although no vegetation would be removed via human actions in the project area at this time, a direct, adverse effect of the No Action alternative would be a continued decline in horizontal, vertical, and vegetation species diversity represented by the early-successional regeneration age class (USDA-LRMP 1986a, VII-B-5-13).

An indirect, adverse effect over time would be a potential decline in the diversity of MIS and general wildlife species favoring early-successional habitat, such as some Neotropical migratory songbirds, ruffed grouse, snowshoe hare, and white-tailed deer within the Nubble Project Area. The No Action alternative would not benefit the MIS Eastern kingbird, Eastern bluebird, and mourning warbler representative of the upland opening community type. There would be a potential decline in overall biodiversity at the stand scale due to lack of vegetation in the regeneration age class and paper birch/aspen community types and the associated wildlife species within the project area (NHFG 1996). There would be no direct or indirect effects to aquatic biodiversity or recreational fishing opportunities within the Nubble Project Area.

Changes in the existing condition of vegetation type or age class composition would occur through the natural process of forest succession or natural disturbances. There would be no creation of regeneration habitat, or the conversion of mature forest via vegetation management. Most of the existing clearcuts within the affected environment have entered the young stage, 10 to 49 years old, and are no longer providing regeneration / shrub habitat conditions. The acres that currently fall within the 0 to 9 age class would move into the young stage in the next one to three years. The adjacent CCC and Five Corners Vegetation Management Projects created relatively minor amounts of early-successional habitat in adjacent HMUs. By 2012, these acres would have grown into the young-age class and would no longer provide regeneration age class habitat.

With long-term continuation of No Action, habitat conditions across the landscape would become uniform. The majority of the affected environment would be comprised of mature northern hardwood forest as the existing stands would mature. The few existing stands of paper birch would convert to softwoods or other hardwoods. Natural events such as wind-throw would create some existing small sized upland openings.

Alternatives 2 and 3

Potential Direct and Indirect Effects

None of the action alternatives would cause forest fragmentation, but would cause minor, localized, and temporary effects of conversion of vegetation age class and species composition at the stand scale within the Nubble Project Area. However, the conversion of mature forest to early-successional or regeneration age habitat would affect biodiversity neutrally at the stand scale. When forest cover is removed, there is likely a decrease in closed-canopy obligate bird species, like the ovenbird or wood thrush, or management indicator species broad-winged hawk and a subsequent replacement with early-successional forest species such as MIS chestnut-sided and mourning warblers. Therefore, due to the minor, localized, and short-term effects from conversion of vegetation age class and species composition, the Proposed Action and any of the action alternatives would cause neutral shifts in biodiversity at the stand scale. However, they would not cause an overall loss in aquatic or terrestrial vegetation or wildlife species biodiversity within the proposed Nubble Project Area; nor at the landscape level within

New Hampshire; nor regionally within New England.

Structural diversity would be maintained through aging trees and through snag and course woody material recruitment outside of the harvest units within the proposed Nubble Project Area. Natural corridors along with natural barriers would remain intact so as not to interrupt the existing ecological processes.

The potential direct and indirect effects on aquatic species and habitat analyzed in the Aquatics Section would be minor, localized, and short-term. Forest Plan Soil, Water, Wildlife, Riparian, and Fish Habitat Standards & Guidelines common to all action alternatives would protect, maintain, and promote the structure and function of riparian areas and for large woody material recruitment and stream and soil nutrient loading processes. The Proposed Action or any of the action alternatives would not interrupt the life history processes of aquatic or terrestrial wildlife or plant species or biodiversity processes such as genetic interaction to maintain viability. The ecosystems within the Nubble Project Area would continue to function.

3.2.4.3 Cumulative Effects on Biodiversity

The analysis area for assessing the past, present, and reasonable foreseeable future cumulative effects on biodiversity included:

- The site-specific Nubble Project Area and the sub-watersheds (aquatics).
- The MAs 2.1 and 3.1 within HMUs 110 & 111.

This analysis also used the broader forest-wide landscape and regional analysis scales to assess potential cumulative effects to wildlife habitat distribution and connectivity, species diversity, and population trends and viability within the forest-wide planning area per 36 CFR 219.19 (USDA-FS 2001):

- Lynx Assessment Unit 10 analyzed in the Nubble BE/BA.
- The Partners In Flight Physiographic Area 28, including the WMNF (Neotropical migratory birds/hawks).
- The New England and White Mountain subsection regional landscape scales (large mammals).

Alternative 1 - No Action

The No Action alternative would add negative cumulative effects to the existing lack of early-successional habitat at the local project area, the forest-wide landscape, and the New England regional levels. There would be no adverse cumulative effects to aquatic biodiversity or recreational fishing opportunities within the Nubble analysis area from the No Acton.

Alternatives 2 & 3

Inversely, due to maturing forest conditions over the past decade in the White Mountain National Forest and in the New England region, all of the action alternatives would add positive cumulative effects from creation of early-successional habitat and promote overall habitat and species biodiversity at the local stand and Forest-wide landscape and regional levels (NHFG 1996). The action alternatives would not reduce landscape linkages necessary for maintaining population viability of wildlife species including WMNF MIS. The action alternatives would not reduce the varying ecological conditions of the region in which the Nubble Project Area is located.

Implementation of the Proposed Action or any of the action alternatives of the Nubble Vegetation Management Project (coupled with the recent CCC and Five Corners Vegetation Management Projects) would not cause an overall change in the land use pattern from a heavily forested a non-forested landscape. Undisturbed forest blocks in the HMUs and forest-wide planning area would continue to add to the variety of life and its processes. There are no reasonably foreseeable future vegetation management projects planned for the Nubble Project Area.

The effects to biodiversity from the action alternatives described in this section and in other biological resource sections would be relatively minor, localized and short-term. It is important to note that short-term management decisions may have long-term implications for biodiversity (NHFG 1996). Implementation of any action alternative would have some long-term effects on biodiversity at the local stand scale and at the species composition level (alpha diversity), primarily through creation or maintenance of permanent forest clearings. In addition, local ecosystems form the matrix of species and genetic diversity, which can affect regional ecosystem health (CEQ 1993). However, elements of the Proposed Action and all action alternatives would not cumulatively alter regional ecosystem dynamics by suppressing natural processes, such a genetic exchange, predator-prey relationships, dispersal, or any other factor integral to maintaining biodiversity, or coarse a large-scale change in landscape context.

In summary, the action alternatives would cause neutral shifts in vegetation communities and/or wildlife species composition and forest stand age classes would occur at a local scale with no cumulative effect on overall biodiversity at the landscape or regional levels. There would be no adverse cumulative effects to aquatic biodiversity or recreational fishing opportunities within the Nubble analysis area from the Action Alternatives.

The Proposed Action or any action alternative would not cause adverse cumulative effects on any MIS, rare, or ecologically important species or ecosystems. The cumulative effects on wildlife, vegetation, aquatic, cultural resources are within the range of those described in the FEIS (USDA 1986, IV-62).

3.3 Socio-economic Environment

3.3.1 CULTURAL RESOURCES

3.3.1.1 Cultural Resources Affected Environment

Cultural resource surveys have been conducted for the Nubble Project Area (CRRR# 02-1-114 and CRRR# 02-1-115). No prehistoric sites were found during shovel test pit digs in likely areas. Recorded historic sites include:

- The Little River Railroad grade in Compartment 19, Stand 80.
- A logging camp from the 1930's along Haystack Brook that is outside proposed harvest units.
- A cellar hole from a recreational camp well outside the project area.

The Nubble Project Area is a moderately used recreation destination. The three cultural sites in the project area are a result of past land use history associated with railroad-era logging and summer recreational use. There may be additional sites in the project area that have not been discovered.

3.3.2.2 Cultural Resources – Related Mitigation Measures

- Project layout will insure avoidance of known cultural sites with the exception of the Little River Railroad grade.
- The Little River Railroad (historic railroad grade) may be crossed by skid trails. However, this will be done over snow and frozen ground conditions to minimize impacts. Crossings will be at right angles to the railroad grade to minimize the chance of ground disturbance to the resource.
- If, in the course of any project activities, previously unknown sites or artifacts are located, activities will stop immediately in that location. The district heritage paraprofessional and Forest archaeologist will be called in to evaluate the finds and make recommendations on how to proceed
- Units adjacent to known cultural sites will be logged on frozen ground to help protect historic values associated with the sites.

3.3.2.3 Direct and Indirect Effects on Cultural Resources

Alternative 1 – No Action

No activities are proposed for this entry under Alternative 1. Current level of public visitation may result in some impacts to sites that will be addressed by standard Forest Service cultural resource and law enforcement policy.

Alternative 2-3

The White Mountain National Forest works in consultation with the New Hampshire State Historic Preservation Office to design projects that are determined to have no effect upon cultural sites in accordance with 36 CFR 800 and The National Historic Preservation Act of 1966,

as amended.

Under Alternatives 2-3, known sites within the project area will be avoided during layout, marking, and logging operations. The mitigation measures listed above are designed to eliminate or lessen any impacts to heritage sites or site values from timber harvesting. These mitigations are in accordance with State Historic Preservation Office (SHPO) guidance and have been used successfully on other similar vegetation management projects across the Forest.

The Little River Railroad will be crossed by a minimal number of skid trails that will be done over snow cover and/or frozen ground conditions. Sites will be identified on the sale area map and included in the timber sale contract. This will ensure that sites are protected and avoided during logging operations and will prevent heavy equipment and other sale activities from disturbing sites. Mitigation measures for over snow and/or frozen ground will stop or appropriately minimize impacts to the railroad grade. If the mitigation measures are followed, no effects to cultural resource sites in the Nubble Project Area are anticipated.

The mandatory heritage clause within the timber sale contract is worded to address the possibility of finding additional cultural sites and outlines steps for managing them through contract modification to address heritage values present.

Short-term changes in the vegetation may draw the public's attention to certain sites. The Forest will take steps to educate the public about protection of cultural sites and their role to leave sites as they find them. As the vegetation regenerates site locations should be less visible and less of a temptation to the public.

3.3.2.4 Cumulative Effects on Cultural Resources

For cultural resource analysis purposes, the scope of the cumulative effects area is through the year 2012 for the Nubble Project Area. Choosing a wider area might dilute any possible cumulative effects on the heritage resource.

There has been timber harvesting in the area during the past 25 years (see Table 1 Appendix C). Similar mitigation measures were used to protect cultural sites in that project. As with the Hawthorn Knob project, steps have been taken in the Nubble Project Area to avoid and protect known cultural sites. This has been accomplished during project layout and throughout the project. No additional projects are anticipated in this area in the foreseeable future.

No cumulative effects are anticipated beyond the effects discussed in §**3.3.2.3** above.

3.3.2 RECREATION

3.3.2.1 Recreation Affected Environment

Recreational settings for the Nubble Project Area are Semi-Primitive Motorized (MA 2.1, Forest Plan, p.III-30) and Roaded Natural Recreation Opportunity Spectrum (ROS) Classes (MA 3.1, Forest Plan, p.III-36) (Forest Plan, ROS, Appendix H). Primary recreation activities within the project area include: hiking, hunting, cross-country skiing, snowmobiling, dispersed camping, fishing, driving for pleasure, and mountain biking.

Trails

There are approximately 8 miles of hiking trails in the project area (Gale River and North Twin), 7.4 miles of cross-country/mountain bike trail (Beaver Brook complex) and 6.6 miles of snowmobile trail (see Map 1 and Appendix C for details).

Dispersed Camping

Camping is permitted at designated sites within ¼ mile of the roads in the project area. There are approximately 13 sites designated along FR 304 and seven (7) along FR 92. Sites are limited to 15 people, 14 nights and 3 vehicles. Most of the sites along Forest Road 308 were stump dumps created during the road construction. They were flattened and shaped for roadside camping. These sites are heavily used being occupied approximately 90% of the time on weekends during the summer. Use is light mid-week during the summer and weekends in spring and fall when use drops to 20% (Gigliell0 2003). Campers are required to display a White Mountain National Forest Parking Pass to camp at these sites. No services are provided other then signs providing information concerning human waste disposal and food storage. The Forest Service mows grass as needed and patrols the sites cleaning litter where necessary.

Fishing

The NH State Fish and Game Department stocks both the North Branch Gale and Little Rivers with Eastern brook trout (§**Aquatic Resources**). Based on local knowledge and

direct observations, fishing activity associated with these streams is relatively light to moderate (personal communication with Forest Service Biologist Weloth). The State of New Hampshire and the Forest Service have jointly worked on stocking of both rivers for the restoration of the Atlantic salmon. (See §**Aquatic Resources** for additional information.).

Hunting

Based on local knowledge and direct observations, small and big game hunting activity associated with this area is relatively moderate to heavy (personnel communication with Forest Service Biologist Weloth). This area receives heavy big game hunting pressure, particularly moose hunting. Due to previous timber management activities, specifically regeneration of the aspen-paper birch type, moose and deer frequently browse the area. In recent years, the frequency of seeing big game is decreasing as the young trees in the clearcuts and groups become larger (see the **Terrestrial Resources** section of this document for further information).

3.3.3.2 Recreation – Related Mitigation Measures

In addition to the generally applicable Forest and Management area-wide Standards and Guidelines listed in the Forest Plan in section III and Appendix VIIB, pp. 18-22, the following specific mitigation or coordination measures would be used in implementing the proposed activities:

- Minimize the number of skid trail crossings of the Beaver Brook Cross Country Ski trails and the Haystack Connecter Snowmobile Trail (State Corridor Route 11) to minimize the impact to the trails and usurers.
- Where skid trails do cross ski or snowmobile trails, and logging may occur during the winter season, warning signs will be posted at the entrance to the affected section of trail, snowmobile speeds will be restricted to 10 mph approaching skid trail crossings, and stop sign will be installed at the skid trail, ski/snowmobile crossings. A stop sign/warning sign will be posted 250 ft prior to the skid trail crossing. Where trees are to be felled within 200 ft of an active trail the timber purchaser will post flag persons to control traffic and insure safety for the trail users.
- Winter use trails will be closed during other seasons when logging is occurring.
- Signs will be posted at trail-heads to explain the possible interruption or modification of trail use. The objectives and benefits of the timber sale will be explained as part of that message.
- A signing plan will be developed that lists the conditions which require signs to be posted and shows the location where signs are to be posted. The plan will be covered in the pre-work meeting with the purchaser. The sale administrator will obtain the required signs and have them available for the purchaser to post when as needed.
- Snowmobiles will be restricted from using Forest Road 25 during hauling. Snowmobiles will be rerouted along the existing snowmobile by pass (Maps 4 & 5), which parallels Forest Road 25. This includes bypassing the west end of the Haystack Connector for approximately ¼ mile.
- During winter operations, signs indicating "No Snowmobiling" will be posted at all entry points to Forest Roads 304 and 25. These signs would be required by the sale contract. Coordination with snowmobile clubs will occur prior to sale activity. This coordination would be required in the sale contract.
- Before Labor Day, summer harvesting may occur on non-holiday weekdays in compartment 19, stands: 42, 44, 58, 70, 71, 73, 99, and compartment 20, stands 20, 21, and 32. Summer hauling and harvesting on the Haystack Road (FR304) and the Gale River Road (FR 25) will be limited to the hours between 8:00 AM and 5:00 PM.
- During winter harvesting operations in stands 19/63, 20/24, 20/67, and 20/75 will be restricted to non-holiday weekdays between 8:00 AM and 5:00 PM.
- Trails will be kept free of slash during and after sale operations as a safety precaution.
- Temporary closures (one to three days) will occur along Beaver Brook Ski trails mid-

week. Trails will remain open on holidays and weekends. Closures will be posted at the trailheads and both ends of the sections of trail being closed.

- Campsites along FR25 and FR304 will be posted to notify campers when logging is in progress.
- Warning signs will be posted on FR25 and FR304 when hauling is in progress.

3.3.3.3 Direct and Indirect Effects on Recreation

Semi-primitive motorized and roaded natural opportunities would continue to be provided under all alternatives. For all alternatives, the noise associated with maintaining roads would be evident to any one recreating in this area. Under Alternatives 2 and 3, the noise level will increase due to the harvesting operations. Under all alternatives, the noise level would be acceptable for semi-primitive motorized and roaded natural recreation classes.

No new activities would be implemented at this time under Alternative 1. No direct or indirect effects are anticipated to the hiking, dispersed camping, or fishing recreational experiences.

Under Alternatives 2 and 3, there will be evidence of human activity - sounds of equipment, log trucks, and the change in vegetation resulting from timber harvesting. Where resource conditions permit, harvesting will occur to minimize the effects on winter recreation activities.

Trails

Alternative 2

There are no cutting units immediately adjacent to either the North Twin or Gale River Trails, and no skid trails cross either of the hiking trails. Hikers may encounter logging trucks on the Forest Roads 25 and 304 while driving to these trailheads. Hikers may hear the sounds of chainsaws and equipment in the distance while on the first mile of the Gale River and the North Twin Trails.

In the past, harvesting has occurred adjacent to the Beaver Brook Cross-Country Ski Trail. Temporary openings created by harvesting under Alternative 2 would continue to provide views of the surrounding mountains.

To ensure public safety, temporary trail closures (one to three days) will occur along Beaver Brook Ski trails mid-week when logging would occur within 200 feet of the trail. Closures will be posted at the parking area and both ends of the affected sections of the trail. This will protect public safety by minimizing the possibility of skiing and harvesting operations occurring the same place.

Skid trails may cross the ski trail at specified areas. Where these crossings occur, warning signs will be posted 250 feet before the crossings, and stop signs will be posted at the crossings.

These mitigation measures have been used effectively to ensure public safety in this area during past timber such as Hawthorn Knob and North Branch.

To allow joint use of the area by snowmobilers and harvesting operations and to ensure public safety, snowmobiles will be rerouted across the existing bypass trail (Map 1). The bypass has not been used for approximately ten years and will need to be brushed and cleared. Clearing and brushing may be done in conjunction with snowmobile clubs and the state. Skid trails may cross the snowmobile trail at specified areas. Where these crossings occur, warning signs will be posted 250 feet before the crossings, and stop signs will be posted at the crossings.

These mitigation measures have been used effectively to ensure public safety on the ski and snowmobile trails in this area during past timber such as Hawthorn Knob and North Branch.

Alternative 3

There is a slight increase in the number of cutting units proposed in Alternative 3 over Alternative 2, and some uneven-aged management prescriptions have been changed to clearcutting. The same mitigation measures will apply. The effects will be similar to Alternative 2. Temporary openings would be larger and more numerous. This alternative would require additional temporary trail closures and increase the opportunity for encounters with logging operations.

Dispersed Camping

Alternative 2

Before Labor Day, summer harvesting may occur on non-holiday weekdays in compartment 19, stands: 42, 44, 58, 70, 71, 73, 99, and compartment 20, stands 20, 21, and 32. Summer hauling and harvesting on the Haystack Road (FR304) and the Gale River Road (FR 25) will be limited to the hours between 8:00 AM and 5:00 PM. This will limit the impact on campers from logging operations.

Signs will be posted at campsite locations along FR25 and FR304 notifying campers when logging will occur. One of the designated campsites located in an old log landing along Forest Road 25 will be closed and reused as a log landing for the timber sale. After the timber sale is complete, it will be restored and opened for camping. Other campers using sites along this road after Labor Day may experience truck traffic and the sounds of harvesting on non-holiday weekdays between 8:00 AM to 5:00 PM.

These mitigation measures have been used effectively to ensure public safety on the ski and snowmobile trails in this area during past timber such as Hawthorn Knob and North Branch.

Alternative 3

There is a slight increase in the number of cutting units proposed in Alternative 3 over Alternative 2. The same mitigation measures will apply. The effects will be similar to Alternative 2 but may include some additional temporary trail closures and increased opportunity for encounters with logging operations.

Fishing

No effects are anticipated under Alternative 1. Under Alternatives 2 and 3, there are no direct effects expected to recreational fishing. The effect of logging occurring in the project area could be to reduce the solitude experienced by people fishing. In the short term, this could cause some people to fish elsewhere when harvesting is occurring and return when harvesting is completed.

Hunting

Alternative 1

A direct effect of no action is a continued decline in early-successional habitat. Some game species that use this habitat, such as moose, deer, and snowshoe hare, would not find this habitat component within the project area. Indirectly, people interested in hunting these species will probably go elsewhere to find more plentiful game.

Alternatives 2 and 3

Alternative 2 would create approximately 114 acres of early-successional habitat. This would provide habitat for game species that use this habitat component. Indirectly, people interested in hunting these species would probably find more game in these areas.

Alternative 3 would create approximately 329 acres of early-successional habitat (approximately 2.4X greater than Alternative 2). This would provide habitat for game species that use this habitat component. Indirectly, people interested in hunting these species potentially could find more game in these areas compared to Alternative 2.

3.3.2.4 Cumulative Effects on Recreation

In the short term, vegetative management may effect the recreation experience through noise, encounters with logging operations, and alterations to the vegetation (see visual discussion).

The Bickford timber sale (in compartment 23 west of the Nubble project) is the only active timber sale in the vicinity of the Nubble Project Area (expected completion date 6/06). The only other recent projects in the vicinity were the CCC sale, in compartment 24 immediately to the north, completed in 1998, and the Twin Pups Sale, in compartment 17 immediately to the east, completed in 2001. Activities proposed in the Nubble project could be completed in 2006. No additional vegetation management is anticipated to occur through 2016.

The cumulative effects area includes compartments 17, 19, 20, 22, 23, and 24, which would include proposed activities in the Nubble project and ongoing activities in the Bickford timber sale and past activities from the CCC and Twin Pups sales.

There are some harvesting units in the Bickford sale that require skid trails to cross the snowmobile trail. Mitigation measures require stop signs at these crossings as they would in the Nubble project. The cumulative effect of people using the snowmobile trail west of the Bickford trail and east of the Nubble project would be a

possible increase in the number of skid trail crossings and associated stop signs.

Hauling associated with the Bickford timber sale occurs on FR 92. People using the Garfield Trail (hiking) can encounter logging trucks on non-holiday weekdays. The same mitigation measures are in effect for the Bickford timber sale as are proposed for the Nubble project. The cumulative effect to hikers from the Nubble project and the Bickford sale would be an increased possibility of encounters with log trucks on non-holiday weekdays for people accessing the three hiking trails in the area (Garfield, Gale Rover, and North Twin).

Activities that visually alter vegetation may be perceived as either a positive (a vista created by a temporary opening) or negative (an area of stumps and logging slash) effect on recreation experiences. These effects are short term in nature. By ten years after harvesting trees will have grown up enough so that a vista would be lost, and that stumps and slash are covered by vegetation.

If the activities proposed in the Nubble Project were completed in 2006, the short-term visual vegetation effects to recreationists from the Nubble project and the CCC, Twin Pups, and Bickford Timber sales would occur in varying degrees through approximately 2016.

The cumulative effects to hunting and fishing would be similar to those discussed under direct/indirect effects through 2016.

3.3.3 VISUAL QUALITY

3.3.3.1 Visual Affected Environment

The Nubble Project Area is a forested landscape and is typical of management area 2.1 and 3.1 lands. It is a coming together of scattered softwood and mixed hardwood stands in a landscape that is dominated by hardwood vegetation. North Twin Mountain and Middle Sugarloaf dominate the project area, along with a smaller peak locally called the Nubble.

There is considerable variety in the forested landscape from previous timber harvesting in both the project and cumulative affects area.

The project area includes two Variety Classes (Forest Plan Appendix I, pp. VII-I-1 and VII-I-2):

- B (Common) - areas where features contain variety, but which tend to be common and are not outstanding by visual quality;
- C (Minimal) - features which have little variety by themselves or in combination

Most of the land within the project area is Variety Class B, Common. A small amount of Class C, Minimal, can also be found in the lower, flatter portions of the project area.

The project area spans lower to mid-mountain slopes ranging in elevation from 1300 to 2450 feet. The landscape is characterized by a large expanse of hardwoods with lesser amounts of evergreens situated primarily along streams and at the higher elevations. A variety of textures are visible on the hardwood-dominated slopes resulting largely from harvesting activities that have taken place over the last twenty-five years. Higher up on the slopes and outside of the project area in Management Area 6.2 the texture patterns originate from the 1903 Forest Fire and periodic landslides that scar the steeper slopes of North Twin.

Viewpoints

The visual quality of the Nubble project is assessed from sensitivity level 1 viewpoints, Twin Mountain Motels and the junction of Routes 3 and 302 and sensitivity level 2 viewpoint, Middle Sugarloaf. All three are a Visual Quality Objective (VQO) of partial retention. Viewpoints from South Twin and Mount Hale were considered but eliminated based on topography, which prevents a view into the project area.

Visual quality is also assessed from sensitivity level 1 use areas, Route 3 and the Beaver Brook Picnic Area, and sensitivity level 2 use areas, Beaver Brook Cross Country Ski Trails and the snowmobile trail system. The VQO for all use areas, except the Beaver Brook Picnic Area is retention and partial retention. The Beaver Brook Picnic Area is partial retention only.

For more detailed information on the viewpoints and use areas, including a list of individual stands proposed for treatment, see Appendix C

The desired condition (DC) within the project area is to meet the VQO standards and guidelines as outlined in the Forest Plan and to ensure that any management activities

blend into the existing environment. Activities should add to the visual diversity without detracting from the natural beauty.

Forest management and timber harvesting have been common activities in this area since approximately 1893. In order to preserve the visual values associated with the recreation activities in this area, visual effects have been carefully managed by adhering to Forest Plan visual quality guidelines for Management Area 2.1 and 3.1 lands.

Human activity within and around the project area is noticeable. This includes evidence of past timber harvesting activities, dispersed roadside camping, roads, and an abandoned railroad grade.

3.3.3.2 Visual - Related Mitigation Measures

- Slash disposal zones and treatment would be as follows:

  From the edge of the Gale River and Haystack Roads (FR 25 and 304) all slash from purchasers operations would be removed a distance of 50' and lopped to within 3' of the ground for another 50'.

  From the edge of the Beaver Brook Ski Trails all slash from purchasers operations would be removed a distance of 25' and lopped to within 3' of the ground for another 25'.
- Leave a forested buffer around the base of the prominent rock outcrop known as the Nubble.
- Provide a filtered view of the proposed clearcut in stand 70 of compartment 19 along the snowmobile trail. Retain a visual strip by removing an increasing number of trees for a strip 66 feet wide along the trail to meet the VQO.

3.3.3.3 Direct and Indirect Effects on Visuals

Different silvicultural treatments produce different visual effects. The general effects of timber harvesting activities can be found in the Forest Plan FEIS, p. IV-33 and Appendix C, §**B.2.4.2**. A goal for management area 2.1 lands is to protect and enhance visual quality. For management area 2.1 and 3.1 lands, the desired condition is to have a mosaic of forested stands varying in size, shape, height, and species. Some stands would consist of trees of the same age and height, while others would consist of a mix of sizes and ages ranging from seedlings to very large, mature trees. The choice of harvesting methods is described in the Forest Plan VII-M-8.

Appendix C, §**B.2.4.2**, provides details of individual stand treatments, VQOs and how each proposed stand treatment meets VQOs.

Alternative 1 – No Action

No harvesting is proposed this entry under Alternative 1. With this alternative, there would be little or no change in the visual environment from that which currently exists within the project area. Any changes in the existing forested landscape would result from natural causes. As areas harvested during earlier sales reach maturity, the existing mosaic pattern resulting from those activities would be replaced by a consistent vegetative texture with few naturally occurring openings. Without new openings in the canopy, either through human manipulation of the canopy or natural occurrences, the vegetation would not offer as much diversity of tree species, such as paper birch and aspen, as there would be if openings where present.

Alternatives 2 and 3

The visual effects of proposed harvesting varies in relation to the intensity of the harvesting method. The clearcut stands would have the greatest long-term effects while single-tree selection the least. Single-tree selection cuts can affect the visual quality of the landscape by allowing sunlight to penetrate the forest canopy, which allows more visibility at the ground level and improves the growth of the shrub layer.

Slash disposal along roads and trails would mitigate the effect of harvesting in these areas, by reducing the height of slash and making stumps less visible. The proposed units have been designed to soften the transition between and avoid abrupt changes in canopy heights and density. In addition, clearcut units would retain selected residual trees in groups of five or more trees to break up the open expanse of the treatment unit. These residual trees would also be coordinated with wildlife leave trees into leave-tree islands within openings to help prevent possible windthrow. Where possible, especially in larger clearcut openings, additional quarter-acre patches or individual trees would be left in place to add diversity to the regenerating stand. These would also add to the visual diversity of the landscape.

Evidence of harvesting activity would be of irregular size and shape and would be in harmony with the naturally appearing landscape under both alternatives. However, there would

be less visual change across the landscape with Alternative 2 than with Alternative 3. The intensity would also be less, as there are more units proposed for uneven-aged management (single-tree selection, groups, and single-tree selection/groups) than even-aged management (clearcutting and patch clearcutting).

Alternative 2 meets the VQO for all stands as viewed from the listed viewpoints and use areas. Proposed treatments in Alternative 3 would be more visually apparent. Stands 46,57, and 96 of compartment 19 are enlarged (5,4, and 5 acres respectively) to include all the area suitable for clearcutting. These stands are visible from several viewpoints. In Alternative 2 the area cut is masked by the stands before them and leave patches within them.

In Alternative 3 these clearcuts would be expanded so that 14 acres of disturbed area would be visible form the higher vantage points. About seven acres of disturbance would be visible from Twin Mountain. Twenty-one additional acres of clearcut or patch clearcut would be visible from the ski trail. Visual quality objectives of partial retention in 2 unseen areas would not be met.

This larger visible cutting area would meet the minimum VQO in the Forest Plan. However, the combination of higher than average viewpoint sensitivity and the arrangement of the topography makes the effect more noticeable.

Several proposed even-aged regeneration treatments in Alternative 3 are adjacent to the Beaver Brook Cross country ski trail or FR 25 (compartment 20 stands 16, 19, 32, 35, 41, 49, 52, & 86). By using patch clearcutting, by reducing the area treated, or by modifying the shape and location, as proposed in Alternative 3, these units would meet the minimum VQOs in the Forest Plan. The collective visual effect of the treatments proposed in Alternative 3 becomes substantial. Treatments in stands compartment 20, stands 16, 19, and 49 can be deferred until a future entry. Alternative 2 proposes treatments for stands 20/32, 20/35, and 20/41, that, silviculturally (Vegetation Report, Project File), are equal to or more effective than the treatments proposed in Alternative 3.

3.3.3.4 Cumulative Effects on Visuals

The cumulative effects area for the visual analysis is the same seen area as used for the direct/indirect effects, because these are the only viewpoints/view areas from which the proposed treatments in the Nubble project can be seen. The cumulative effects period is from 1986 to 2016 (ten years from the anticipated completion of activities proposed in the Nubble project).

In Addition to the previously mentioned Hawthorn Knob, there have been two timber projects in the cumulative effects area since 1986. The Twin Pups project in Compartment 17 started in 1995 and harvested 391 acres including 320 acres of single-tree selection, 41 acres of group selection, and 30 acres of patch clearcuts. The CCC Project in Compartment 24 started in 1993 and harvested 640 acres including 223 acres of single-tree selection, 375 acres of group selection, 37 acres of thinning, and 5 acres of overstory removal. No additional harvesting is anticipated in the seen area on federal land through 2016. There are approximately 1,200 acres of private land in the seen area, and it is not known what vegetative management will occur in this area in the foreseeable future.

Any visual effects from vegetation harvested more than fifteen years ago would be well recovered, although there would remain some visual evidence from certain viewpoints due to differences in the vegetative texture (older versus younger trees).

Because of to the topography, existing vegetation densities in the Foreground Distance Zone, and the low number of viewpoints, this area is well able to absorb the cumulative visual changes due to past and proposed vegetative management under Alternatives 2 and 3.

Alternative 1 – No Action

Because no harvesting is proposed under Alternative 1, there were no direct or indirect visual effects under Alternative 1, and, therefore, no cumulative effects.

Alternatives 2 and 3

The following table displays the total acres of treatments in the cumulative effects area for the past 15 years. No additional vegetative treatments are expected on federal land through 2016.

Because of the topography in the cumulative effects area, existing vegetation densities in the Foreground Distance Zone, and the limited number of viewpoints, this area is well able to absorb the cumulative visual changes due to past and proposed vegetative management under Alternatives 2 and 3.

Alternatives 2

Treatments proposed in this alternative meet the visual quality objectives in the Forest Plan. None of the disturbed area will be visible from Twin Mountain or Sugarloaf viewpoints. Some vegetative change will be noticeable. About 110 acres of vegetation change in group selections and tree line changes due to clearcutting would be added to the 120 acres of vegetation change that is currently in transition.

Past management activities have affected foreground scenes along the roads and trails.

There are six older clearcuts and 3 stands with group cuts that provided openings in a forest setting and, in some cases, vistas along the Beaver Brook Ski Trail. Alternative 2 proposes six additional stands of group selection. Some groups are designed to be vistas.

There is one patch clearcut and two stands with group selection along FR25 and FR304. Alternative 2 proposes six additional stands of group selection resulting in about 15 group areas adjacent to the road. These groups would provide visual diversity along roads with a forested setting.

Alternative 3

Alternative 3 has the same cumulative effects as Alternative 2 with additional the treatments and prescriptions changes as discussed in direct/indirect effects above.

In terms of numbers the additional effects are not large. However, because of the visual sensitivity of some of the viewpoints, the effects are substantially different than Alternative 2.

2.3. 3 COMMUNITY, ENVIRONMENTAL JUSTICE, & ECONOMICS

3.3.4.1 Community, Environmental Justice, & Economics Affected Environment

The Nubble Project Area is located on federal lands in portions of the towns of Bethlehem (99+%) and Franconia (<1%) in Grafton County, NH. (Map 1). The Town of Bethlehem, located on Rt. 302, is approximately six (6) miles west northwest of the northern project boundary. By Road, Bethlehem is approximately 9+ miles northwest of the northern project boundary. Population of the town is approximately 2,200 people (2000 census data).

Rt. 3 is a well-traveled secondary road that connects Interstate 93 to the west and Rt. 302 to the north and east. Recreation visitors in the Nubble area would most likely buy supplies in either Bethlehem or at shops and gas stations located at the junction of routes 3 and 302, approximately 6 miles east of the northern project boundary (Twin Mountain).

There are no private residences within a mile of the project area.

There are numerous costs associated with implementing a project on the National Forest. The 'up front' costs are the planning costs. Project planning involves a number of preliminary steps and associated costs. The environmental analysis required by NEPA is one component of the planning effort for project implementation. Other planning activities include: silvicultural and biological surveys; fieldwork, development of stand prescriptions, and project layout; data collection and entry; planning meetings; public involvement; and preparation of an environmental assessment and decision documents.

The average unit planning cost to the government for the Ammo/Pemi Ranger District for the fiscal year (FY) 2002 was approximately $33,075/million board feet (MMBF) of timber produced. This is the cost of 'doing business' and is incurred even if the no action alternative is chosen.

Implementation of a project that includes timber management has associated timber sale preparation (marking, appraisal, advertising) and timber sale administration costs (sale inspection, accounting, billing, administration). The average unit cost to the government for the Ammo/Pemi Ranger District for sale preparation was approximately $29,400/MMBF, and for sale administration was approximately $12,337/ MMBF of timber produced for FY02. These cost figures were derived from FY02 district work plans and adjusted for complexity (accessibility of the project area and the time necessary to complete field work). Table 23 displays the costs associated with producing an MMBF of timber.

Table 24: Ammo/Pemi District FY03 Project Costs/MMBF

ACTIVITY	ASSOCIATED COST/ MMBF
Costs:	
Planning (inventory, mapping, layout, prescribing, NEPA)	$33,075
Sale Preparation (marking, appraisal, advertising)	$29,400
Sale Administration (sale inspection, accounting, billing, administration)	$12,3,37
Total Costs to Produce and Administer a Timber Sale	$74,812

The revenue figure for value of timber

harvested is the average of a comparable (green, no salvage) timber sale sold on the White Mountain National Forest in FY02 nearest to the Nubble project.

Table 25: Last Timber Sale Sold on the White Mountain National Forest in FY02 nearest to the Nubble project by Date and Value

Sale Name	FY Sold	Total Value	Total Volume	Average Value/ MMBF
Bickford Timber Sale	2002	$389,218	1.9 MMBF	$200,000

3.3.4.2 Community, Environmental Justice, & Economics Direct and Indirect Effects

There is no private land in the project area.

Many of the values generated by the various alternatives (both positive as well as negative) involve goods and services that are not priced in the market place and, therefore, are not represented in this comparison. These goods and services involve such things as the value of a hunting experience, a hike in the woods, watching wildlife, or the quality of water flowing from the project area. The effects each alternative has on these types of non-priced goods and services are found elsewhere within Chapter 3 under other resource headings. The cost of producing some of these non-priced goods, i.e. creating new wildlife habitat, is included in the total cost figures.

National Forest Land represents over half of the potential tax base for the Town of Bethlehem. Many rural communities like Bethlehem depend on the Timber tax for operating revenue. In the last 5 years the proceeds form this source has declined form a high of $41,012 in 1998 to a low of $6,975 in 2002. This is at least partially true because of a decline in Forest service Sales and the shut down of the Berlin paper mill.

Recreation in the Nubble Project Area is mainly short stay or weekend camping and day-use activities such as, hiking, hunting, biking, and snowmobiling. There are no direct economic benefits to either the Town of Bethlehem from the recreational activities that occur in the project area. This is true for all alternatives.

Basic cost benefit analyses are provided for each alternative. Costs and revenues are not intended to be absolutes, but to display the relative differences between alternatives.

The work involved in planning and analyzing this project included the fieldwork and analysis necessary to evaluate a maximum number of treated acres and associated volume (Alternative 3, 7.2 MMBF). If a lesser number of acres and associated volume are proposed and analyzed in another alternative, the overall planning costs of the project would not decrease. Therefore, for all alternatives, the planning costs are the same"

7.2 MBF x $33,075 = $238,140

Alternative 1 – No Action

No timber is being harvested under Alternative 1, and there would be no timber tax (Appendix C, §**B.2.4.5**) returned to the Town of Bethlehem.

There would continue to limited seasonal employment and income opportunities generated by the dispersed camping permit, but no income and job opportunities would be produced through timber harvesting from the implementation of Alternative 1.

With implementation of Alternative 1, no vegetative treatments would be carried out during this decade. The monetary cost to the government for implementation of Alternative 1 includes the project planning costs and the normal custodial/stewardship costs associated with managing a National Forest (the same for all alternatives and not part of the cost benefit calculations).

The following table displays the federal cost/benefit analysis for the implementation of Alternative 1.

Table 26: Net Return to the Federal treasury for Alternative 1

Activity	Associated Cost or Benefit
Total Planning Costs for the no action alternative	$238,140
Total Revenue	$0
Total net value	**-$238,140**

Grafton County would eventually disburse a portion of the monies received from 25% Fund payments (Appendix C, § **B.5.3**) to the Town of Bethlehem.

Alternatives 2 & 3

There would be limited seasonal employment and income opportunities generated by the timber harvesting from the implementation of Alternatives 2 and 3.

Vegetative treatments prescribed under Alternatives 2 and 3 are estimated to produce approximately 4.8 and 7.5 MMBF respectively. Table 26 displays the Federal Cost Benefit Analysis for implementation of Alternatives 2 and 3.

Additional even-aged regeneration treatments were added to Alternative 3 to more closely achieve Forest Plan age-class objectives for wildlife habitat units. Five stands (50 acres) of

additional treatments meet silvicultural guidelines for regeneration but, logging cost, exceed timber value. These are stands 8 and 77 in compartment 19 and stands 52, and 86 of compartment 20. The skidding distances are long or the terrain is difficult relative to the market value of the timber.

Table 27: Net Return to the Federal Treasury from Implementation of Alternatives 2 & 3

Activity	Alt 2 (4.9 MMBF)	Alt 3 (7.2 MMBF)
Costs:		
Planning	$238,140	$238,140
Sale Prep	$144,060	$211,680
Sale Admin	$60,451	$88,826
Total Costs	***442,651$***	***$538,646***
Revenue:	***$980,000***	***$1,365,000***
Total Net Value	**$537,349**	**$826354**

The estimated bid value of the timber that would be harvested on the portion of the Nubble project located in the Town of Bethlehem under Alternative 2 and 3 is $980,000 and $1,365,000 respectively. Using an average timber tax value, the approximate timber tax revenue returned to the Town of Bethlehem is displayed in the following table

Table 28: Timber Tax Revenue to Town of Bethlehem

	Alt 1	Alt 2	Alt 3
10% Timber Tax Revenue	$0	$98,000	$136,500

Payments under the timber tax would be spread over the life of the sale.

The following table displays the anticipated moneys that would be contributed to Grafton County for the 25% Fund.

Table 29: 25% Fund Revenue Generated

	Alt 1	Alt 2	Alt 3
25% Fund Contribution	$0	$245,000	$341,250

The county retains a portion that represents the share of unincorporated townships. The remainder is distributed to the towns and schools effected by the National Forest. In 2002, the community of Bethlehem received $36,401 form the 25% fund. Timber sales generated by the Nubble project would continue to supply revenues for this fund.

3.3.4.3 Cumulative Effects on Community, Environmental Justice, & Economics

Grafton County is a rural county and is the second largest county geographically, in the state with 1.716.5 square miles or 1.1 million acres. Ninety percent of the landscape is timberland. Grafton County covers nearly one-fifth of the state. The population of Grafton County is estimated at 77, 100 with a population density of 44.9 persons per square mile. Twenty-one of the towns in Grafton County have less than 1,000 people and one-third of the land is owned by either the state or federal government. Due to the abundance of mountains in Grafton County as part of the Appalachian Mountain Range, winter sports are a big attraction. Cannon Mountain, Loon Mountain, Waterville Valley and Tenney Mountain host thousands each weekend who try downhill and cross-country skiing as well as snow-boarding. There is a large network of snow-mobile trails throughout the area. Summer tourists travel to see the Old Man of the Mountain, the Flume Gorge, plus numerous local attractions.

There is one uncut timber sale (Bickford), this project (Haystack and Moose Watch sales) and one additional sale planned for compartment 26 that could generate revenue for this decade in the town of Bethlehem.

Alternative – 1- No Action

Under no action the Bickford Sale and the planned, compartment 26 sale would generate an average of $5,000 per year for a decade in timber tax to the town of Bethlehem.

Alternative –2 & 3

In these alternatives revenues form the Haystack and Moose Watch Sales would generate increased revenues. Alternative 2 would generate and average of $15,000 per year for the decade. Alternative 3 would develop $19,000 per year for the same decade.

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ACRONYMS & ABBREVIATION LIST

The following acronyms and abbreviations may be found in this document.

Ac	Acres
ADO	Appeal Deciding Officer
ALT	Alternative
AMC	Appalachian Mountain Club
AMS	Analysis of the Management Situation
AR	Administrative Record
ARO	Appeal Reviewing Officer
ARPA	Archaeological Resources Protection Act (1979)
ASQ	Allowable Sale Quantity
ATS	Atlantic Salmon
ATV	All Terrain Vehicle
BA	Biological Assessment
BBC	Breeding Bird Census
BBS	Breeding Bird Survey
BE	Biological Evaluation
BKT	Brook Trout
BMPs	Best Management Practices
BO	Biological Opinion
C	Centigrade
C	Compartment
CCC	Civilian Conservation Corps
CCF	Cubic Feet
CCRR	Cultural Resource Report
CDS	Combined Data Systems
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIP	Capitol Investment Plan
CMAI	Culmination of Mean Annual Increment
CO	Contracting Officer
CO	Carbon Monoxide Monitoring
CO2 (CO_2)	Carbon Dioxide Monitoring
CR	Cultural Resources
CT	Timber Sale Contract Special Provisions
CWD	Coarse Woody Debris
DAP	District Automation Program
dbh	Diameter Breast Height
DC	Desired Condition (Composition)
DEIS	Draft Environmental Impact Statement
DEQ	Department of Environmental Quality
DFC	Desired Future Condition
DM	Decision Memo
DN	Decision Notice
DOJ	Department of Justice
EA	Environmental Assessment
EAM	Even-Aged Management
EC	Existing Condition (Composition)
EC & I	Ecological Classification & Inventory
ECS	Ecological Classification System
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ELT	Ecological Land Type
ELTP	Ecological Land Type Phase
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EAWS	Ecosystem Analysis at Watershed Scale
FDR	Forest Development Road
FEIS	Final Environmental Impact Statement
FACA	Federal Advisory Committee Act
FH	Forest Highway
FIA	Forest Inventory & Analysis
FLPMA	Federal Land Policy and Management Act (1976)
FOIA	Freedom of Information Act
FONSI	Finding of No Significant Impact
FORPLAN	Forest Planning Model
FP	Forest Plan
FR	Forest Road
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSR	Forest Service Representative
Ft	Feet
FY	Fiscal Year
GIS	Geographical Information System
GTR	General Technical Report
HMU	Habitat Management Unit
HR	Heritage Resources
HRV	Historical Range of Variability
ID	Interdisciplinary
IDT	Interdisciplinary Team
IN	Insufficient Data
IR	Implementation Record
IRM	Integrated Resource Management
K-V	Knutson-Vanderberg
LAC	Limits of Acceptable Change
LAU	Lynx Analysis Unit
CLCAS	Canada Lynx Conservation Assessment and Strategy
LSC	Land Suitability Class
LRMP	Land and Resource Management Plan
LTA	Land Type Association
M	Meter
M & E	Monitoring and Evaluation
MBTA	Migratory Bird Treaty Act
Mi	Miles
MIS	Management Indicator Species
MMBF	Million Board Feet
MMCF	Million Cubic Feet
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MT	Mountain

MUSYA	Multiple Use Sustained Yield Act
NAAQSs	National Ambient Air Quality Standards
NAGRPA	Native American Grave Protection and Repatriation Act (1990)
NATCRS	National Timber Cruising Program
ND	Data Not Available
NC (NCFES)	North Central Forest Experiment Station
NE (NEFE)	Northeast Forest Experiment Station
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NFSR	National Forest Service Road
NH	New Hampshire
NHFG	New Hampshire Fish & Game
NHNHI	New Hampshire Natural Heritage Inventory
NMFS	National Marine Fisheries Service
NO2 ($N O_2$)	Nitrogen Dioxide
NTMB	Neotropical Migratory Birds
NOI	Notice of Intent
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O3 (O_3)	Ozone
OA	Opportunity Area
OGC	Office of General Council
OHV	Off Highway Vehicle
ORV	Off Road Vehicle
OIG	Office of Inspector General
p.	Page
pp.	Pages
PAOT	People At One Time
Pb	Lead
PG	Page
pH	A chemical term for the hydrogen ion concentration of a solution
PILT	Payment in Lieu of Taxes
PM	Particulate Matter
PNV	Present Net Value
ppb	Parts per Billion
ppm	Parts per Million
PVA	Population Viability Assessment
R	Range
R9	Region Nine
RAP	Roads Analysis Process
RARE	Roadless Area Review and Evaluation
RD	Ranger District
REC	Recreation
RFSS	Regional Forester Sensitive Species
RMO	Riparian Management Objectives
RMO	Road Management Objectives
RO	Regional Office
ROC	Recreational Opportunity Class
ROD	Record of Decision
ROG	Recreational Opportunity Guide
ROS	Recreation Opportunity Spectrum
RPA	Forest and Rangeland Renewable Resources Planning Act
RVD	Recreation Visitor Days
Rx	Prescription
S & G	Standards & Guidelines
§	Section
SCL	Scenery Class/Condition Level
SDEIS	Supplemental Draft Environmental Impact Statement
SHPO	State Historic Preservation Office
SIR	Supplemental Information Report
SMS	Scenery Management System
SO	Supervisor' Office
SO2 (SO_2)	Sulphur Dioxide
SOPA	Schedule of Proposed Actions
SPM	Semi-primitive Motorized
SPMN	Semi-primitive Non-motorized
SS	Sensitive Species
T & E	Threatened and Endangered
T	Township
TESSC	Threatened, Endangered, & Species of Special Concern
TEPS	Threatened, Endangered, Proposed, & Sensitive Species
TMDLs	Total Maximum Daily Loads
TS	Timber Sale
TSPIRS	Timber Sale Program Information Reporting System
TTPP	Timber Theft Prevention Plan
TTY	Teletype
TTD	Telecommunication Devices for the Deaf
UEAM	Uneven-Aged Management
U.S.C.	United States Code
USDA	United Stated Department of Agriculture
USDI	United Stated Department of the Interior
USFWS (USFW&S)	United States Fish & Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VIS	Visitor
VMS	Visual Management System
VOL	Volume
VQO	Visual Quality Objectives
WMNF	White Mountain National Forest
WS&R	Wild & Scenic River
WLDLF (WL)	Wildlife
WSRA	Wild & Scenic River Act
WO	Washington Office

GLOSSARY

Age Class – An aggregation of tree ages into various ranges.

Best Management Practices (BMPs) – Proper methods for the control and dispersal of water on truck roads, skid trails, and log landings to minimize erosion and reduce sediment and temperature changes in streams.

Capability – The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices at a given level of management intensity. Capability depends on current conditions, site conditions such as climate, slope, landforms, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, diseases, and insects.

Clearcutting – the removal in a single cut of the entire standing crop of trees. It prepares the area for rapid seed germination and growth of a new even-aged stand.

Cumulative Impact – The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

Dispersed Recreation – Recreational use outside of developed recreation areas. Includes such activities as hiking, fishing, smowmobiling, and driving for pleasure.

Ecological Land Type (ELT) – An area of land with a distinct combination of natural, physical, chemical and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of a given management practice. In a relatively undisturbed state and/or at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable and uniform plant community. Typical size is generally a hundred acres

Environmental Analysis – An investigation of alternative actions and their predictable effects, including physical, biological, economic, and social consequences and their interactions; short- and long-term effects; and direct, indirect, and cumulative effects. The process provides the information needed for identifying actions that may be categorically excluded, for preparing environmental documents, and for determining whether an environmental impact statement is needed.

Environmental Assessment (EA) – A concise public document that serves to (1) provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact, and (2) aid an agency's compliance with the NEPA when no environmental impact statement is necessary.

Even-aged Management –A timber management system that results in the creation of stands in which trees of essentially the same age grow together. Cutting methods producing even-aged stands are clearcut, shelterwood or seed tree.

Finding of No Significant Impact (FONSI) – A document by a federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and for which an environmental impact statement will not therefore be prepared. It shall include the environmental assessment or a summary of it and shall note any other environmental documents related to it. If the assessment is included, the finding need not repeat but may incorporate it by reference.

Granger-Thye Offset Funds – Collection of monies authorized by the Granger–Thye Act (1978): 3.5% of the assessed real value of the sites are collected. Funds are used for maintenance.

Group Selection – The cutting method that describes the silvicultural system in which trees are removed periodically in small groups, resulting in openings that do not exceed an acre or two in size. This leads to the formation of an uneven-aged stand, in the form of a mosaic of age-class groups in the same forest.

Habitat Management Unit (HMU) – A unit of land approximately 4,000 acres in size, the boundaries of which fall on compartment boundaries, and which contain a mix of habitat types. At least on of these types must be a pond or stream with wetland potential.

Habitat Community (Community Type) – A grouping of forest and non-forest habitat types

Improvement Cutting – A treatment used in uneven-aged management. The cut is designed to change the distribution of tree species composition, size, and quality so that the trees can function better as an uneven-aged stand.

Interdisciplinary Team – A group of individuals with skills from different resources. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process. Their presence is sufficient indication that specific habitat conditions are also present.

Management Area (MA) – The grouping of land areas allocated to similar management goals such as 2.1 and 3.1 that stress vegetation management.

Management Direction – Forest-wide management direction consists of: Forest

management goals, Forest management objectives, Forest-wide standards and guidelines, specific management direction for each management area, the Forest Plan map, and implementation maps. Specific management direction for each management area (MA) consists of: a purpose statement for the MA, the desired condition for the MA, the management prescription for the MA, and the standards and guidelines for the MA.

Management Indicator Species (MIS) – A plant or animal adapted to a particular kind of environment. The arrangement of habitats (by tree species and age group) reflects requirements for selected wildlife species.

Mitigation – includes: 1) avoiding the impact altogether by nit taking a certain action or parts of an action; 20 minimizing impacts limiting the degree or magnitude of the action and its implementation; 3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; 4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; 5) compensating for the impact by replacing or providing substitute resources or environments.

MMBF – A symbol used to indicate 1,000 board feet of wood fiber volume, either in log form or after conversion to lumber.

Payment in Lieu of Taxes (PILT) – The result of a federal law that provides funds to local units of government containing federally-owned lands. The amount of money paid is based on the number of acres of eligible federal land within the town subject to certain limitations.

Twenty-five Percent Fund – The requirement that 25 percent of Forest Service receipts (money from timber sales, campgrounds, and special use permits) be returned to the communities in which they were derived for the benefit of public schools and roads.

People At One Time (PAOT) – A measure indicating the capacity of developed recreation sites. Usually indicated as "5 PAOT" per individual camping or picnic site. The capacity would be five times the total number of sites.

Recreation Opportunity Spectrum (ROS) – A means of expressing a range of recreation experience opportunities. Each part of the spectrum represents a particular kind of experience opportunity.

> **Primitive –** Recreation opportunities characterized by natural appearing environment and high probability of isolation from others. Offers a high degree of challenge and risk.
>
> **Semi-primitive Non-motorized –** Recreation opportunities characterized by a predominantly natural appearing environment and low degree of interactions between users. Evidence of other users is present. Managed to minimize on-site controls and restrictions. Motorized use is not permitted.
>
> **Semi-primitive Motorized -** Same as above but motorized.
>
> **Roaded Natural –** Recreation opportunities characterized by predominantly natural appearing environment but with moderate evidence of human activity. Resource utilization practices are evident.

Road Reconstruction – An activity that results in improvement or realignment of an existing classified road as defined: 1) *Road Improvement* – Activity that results in an increase of an existing road's traffic service level, expands it's capacity, or changes it's original design function; 2) *Road Realignment* – Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway.

Roaded Natural – Recreation opportunities characterized by a predominantly naturally appearing environment but with moderate evidence of human activity.

Semi-primitive Motorized – Recreation opportunities characterized by a predominantly naturally appearing environment and a low degree of interactions between users. Evidence of other users is present. Managed to minimize on-site controls and restrictions. Motorized use is permitted.

Shade Intolerant – Vegetation that need full or near full sunlight to regenerate and grow.

Shade Tolerant – Vegetation that can regenerate and grow in shade or varying degrees of sunlight.

Single-tree Selection – A method where individual trees are selected and cut in a stand while maintaining a prescribed number of trees in each diameter class.

Slash – Debris left after pruning, logging, thinning, or brush cutting, and large accumulation of debris after wind or fire. It includes logs, branches, and stumps.

Turbidity: A physical characteristic of water and is an expression of the optical property that causes light to be scattered and absorbed by particles and molecules rather than transmitted in straight lines through a water sample. It is a measure of the clarity of a water sample.

Uneven-aged Management – The application of a combination of actions needed to maintain continuous high forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter and or age classes to provide a sustained yield of forest products. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group.

MONITORING

Implementation monitoring assesses whether the project was implemented as designed and whether or not it meets Forest Plan standards and guidelines. The project will be reviewed prior to implementation to insure that it is laid out and prescribed as described in this document. Actual amounts of activities accomplished on the ground (measured in acres or miles) may vary slightly. All changes would be evaluated to ensure that any effects are within the parameters of the effects analyzed in this document and would be documented in the Nubble project file. Project implementation is to be inspected at regular intervals to insure that Forest Plan Standard and Guides are being met.